

Green Line LRT

Property Economic Impact Assessment

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The report's analysis was undertaken at a specific point in time Dec/Jan and does not take into account the current economic conditions or the impacts of COVID-19.

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Note to Readers

The analysis for this report was done through December-February of 2020 based on information collected that is recent to December 2019. Through February-March of 2020, while this report was being refined and presented, the COVID-19 pandemic affected business expectations and the economy, among other things.

This analysis should be considered in conjunction with the rapidly evolving body of information and analyses related to COVID-19. There is some reference to COVID-19 in this report and efforts have been made to ensure the text is relevant. The quantitative analysis was conducted before the effects of COVID-19 are known and has not been adjusted. Exclusive of this assignment is further reporting from Hatch on the impacts of global events and other effects to the City of Calgary due to the pandemic.

Also, this report was developed prior to the identification of the 9th Avenue Station and the 2nd Avenue Station being moved underground. Therefore, this report does not take into account the impacts of the 9th Avenue Station, nor the impacts of the 2nd Avenue Station being underground.

1.0 Executive Summary

What are the potential impacts to Calgary City Centre[1] property values (and tax revenues) after construction of the Green Line Light Rail Transit (LRT)? What are the impacts during construction?

Overall impacts are positive. There are different impacts depending on the specific property.

This report is focused on impacts to City assessed property value, and the resultant property tax revenue base for the municipality and the province. In addition to the City and the Province, the report notes that impacts will likely be felt by property and business owners as well.

In the long run, the City, Province and property owners are expected to benefit from property value increases that would be more than what they otherwise would have been without the Green Line. Inherent with any transit infrastructure project, there may be "winners and losers". Within this reality, the report considers a range of scenarios to understand the balance of potential negative and positive impacts.

Estimated Ranges of Potential Impacts

Two methods were used to determine impacts. One method ('Scenario 1') looked at historical Calgary property values related to Calgary Red Line corridor impacts and generated a low, or conservative outcome for the Green Line: 0.7% property value increase year over year. A second method ('Scenario 2') looked at relevant non-Calgary case studies and resulted in a higher, more optimistic outcome: 2.4% year over year. Both the low and high potential outcomes are relative to what property values would have otherwise been without the Green Line LRT. See Table 1 for an overview of the selected case studies for comparison.

To augment these estimates, the team also conducted interviews with Calgary-local real estate investors, brokers and valuation appraisers to provide a qualitative 'real-world' lens to the set challenges already existing and anticipated for the Green Line LRT project. See *Appendix C – Interview with the Calgary Property Industry.*

[1] The area of study is focused on the central segment of the future Green Line alignment in and around the City Centre. Starting from Crescent Heights at 16 Avenue N and the Centre Street North corridor, down south towards the Downtown, over the Bow River and past the area around Eau Clair and Chinatown, to finally the Beltline area along 11 Avenue SE just before the Stampede Grounds.

Table 1 – Comparison of other light rail case studies, their reported property value impacts, the timeframe of which those impacts are reported, and the spatial extent of the impacts

Case Study	*Comparability & Relevance to Green Line*	*Timeframe of Reported Property Value Uplifts*	*Impact Area (Distance to Station)*	*Avg. Annualized Rate of Uplift*
Green Line LRT (Calgary, Canada)	Same urban market; serves suburbs to downtown Calgary like Green Line; some differences in urban form served.	1998-2016 (extrapolated for 2020-2038) Property value uplifts are anticipated to be realized in the long term and may be similarly captured over an 18-year period like the Red Line corridor impacts from 1998-2016.	800m	0.7% 'Scenario 1'
Average of Select Case Studies[2]:	Case studies selected with relatively good relevance to Calgary	Varies All timeframes were more than 10 years	Varies	2.4% 'Scenario 2'
1) Red Line LRT (Calgary, Canada)	Similar economic environment, neighbourhoods and city-shaping forces	1998-2016 An 18-year period of improvements and extensions to a mature transit line that is already in service.	800m	1.0%
2) Confederation Line LRT (Ottawa, Canada)	Involves both surface and underground stations, requiring a portal tunnel in street right-of-way	2008-2021 An 11-year period since the project is announced, through construction and including projections for after construction.	800-m	2.0%
3) Canada Line SkyTrain (Vancouver, Canada)	Involves an elevated transit guideway over rivers and other public spaces	30 years projection Involving a mature transit line that is already in service and undergoing extensions.	300-m	3.3%
4) Downtown Streetcar (Portland, US)	Strong support from City Planning to enable transit oriented development policies and enable further growth	1997-2008 An 11-year period from since the project is approved, through construction and after construction of the transit system, and including subsequent improvements and extensions to its network. Takes into account any additional value created from induced development.	300-m	3.5%

Quick Findings at a Glance

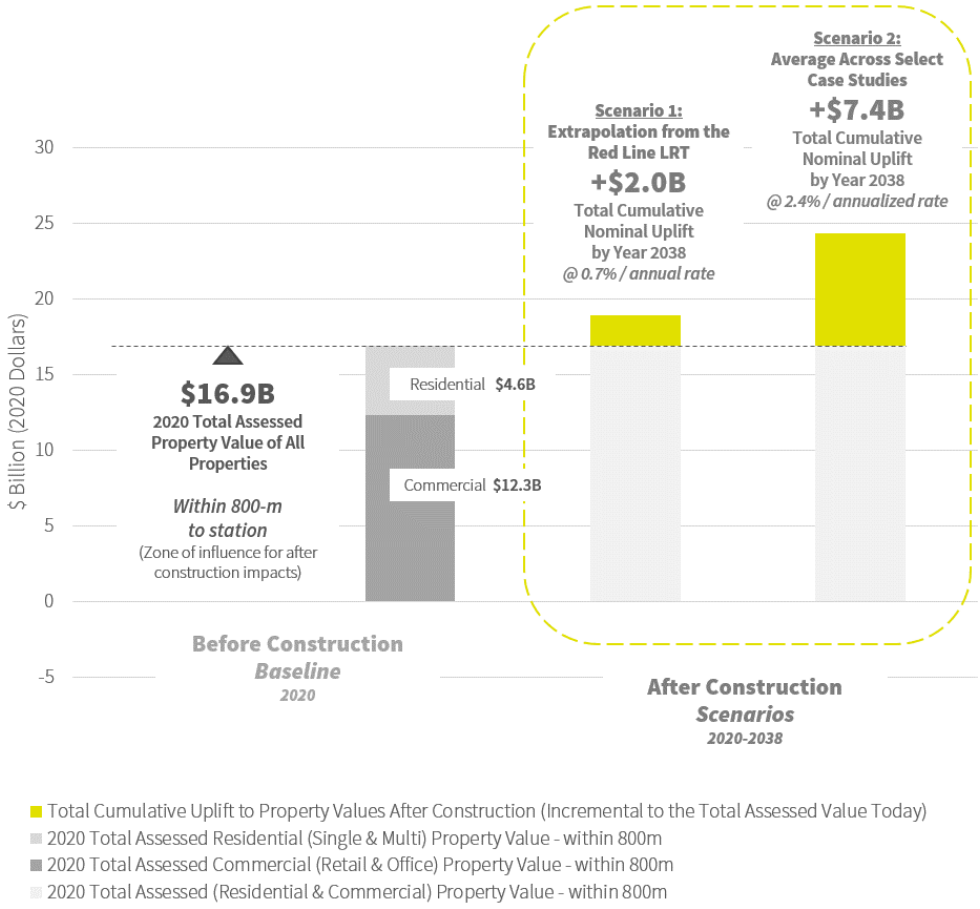
At baseline, today, the total assessed property value of all residential and commercial properties located within an 800-metre radius (or about a 10-minutes walking distance) to a future Green Line station in the City Centre area is over $16.9 billion.[3] This $16.9 billion property tax base, at 2020 values, yields approximately $330 million in annual property tax revenue for the City and the Province (this is both municipal and provincial tax revenue). Commercial properties make up the lion share of the total value. The total assessed value of all commercial properties is $12.3 billion, or more than 70% of the total $16.9 billion.

The conservative potential uplift of 0.7%. would correspond to the property tax base growing as a result of the LRT being constructed; growing from $16.9 billion to $18.9 billion in 2038, and corresponding *additional* annual tax revenues of $43 million in 2038.[4] The high potential uplift of 2.4% would correspond to the property tax base

[2] Additional case studies are provided; however Calgary Red Line, Ottawa Confederation Line, Vancouver Canada Line, and Portland Streetcar were identified as relevant for the purposes of identifying uplift. Additional case studies are Buffalo NY, New Jersey and Toronto Streetcar.
[3] Based on assessed property value provided by the City of Calgary in January 2020.
[4] Per the current 2020 property tax rates for the City of Calgary and the Province of Alberta.

growing from $16.9 billion to $24.3 billion in 2038, and corresponding *additional* annual tax revenues of $144 million. The low and the high uplift estimates set out a reasonable range of outcomes for property value impacts to be expected from implementation of the Green Line LRT.

Figure 1 – Summary of Potential Property Value Impacts, After Construction of the Green Line: Potential impact on property values within proximity to future Green Line LRT station in the City Centre area



To estimate potential impacts, this study assumes uplifts from Green Line would start occurring in 2020. In reality, the timing of uplifts is sensitive to wide market perception that the benefits of the Green Line project will in fact occur. Due to uncertainties related to funding and other government decisions associated with the project, it is possible hat the uplift will not be realized until significant, visible progress (i.e. corridor construction) is present. The estimates made in this study would still be relevant with little deviation even if visible progress was not achieved until the years immediately after 2020.

Short term construction impacts could affect both property owners and businesses. Furthermore, commercial properties are likely to be impacted the most. Disruptions from construction could result in business loss to the area and increased commercial vacancies in already challenged real estate markets.[5] Studies have shown that

[5] Currently a 22% vacancy rate across all office markets in Calgary by Q4 2019 (Avison Young). Retail vacancy is about 6% as of 2019 (Colliers Calgary Retail Report Winter 2018/2019). According to CMHC in its 2020 Rental Market Report for Calgary CMA, demand in the residential rental market remains strong, due to improving labour market conditions, and would likely not be affected in the same way as the commercial market.

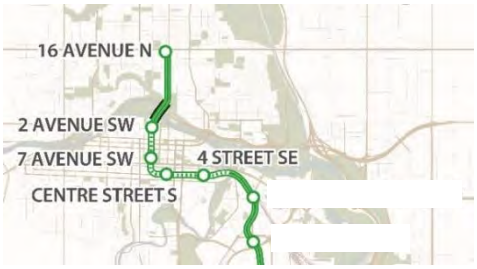
construction impacts are felt by properties and businesses within 400-metres to station construction areas.[6] Practically, construction impacts will be experienced by properties and businesses on a case by case basis depending on the nature of the construction nearby, and the extent that the local transportation network is affected. In some cases where access is impacted, areas may be affected, but in other areas there may be very local impacts and businesses within the 400-metre radius will not actually be affected to any degree of significance.

There are stakeholder concerns around potential negative impacts due to station construction, and the strain this will have on already challenged leasing activity for commercial space—specifically in and around the Downtown area. Concerns voiced by stakeholders include increased traffic congestion and inconvenienced access to parkades; as well as unsafe and unattractive pedestrian environments due to components of transit infrastructure such as the portals and the station platforms and access areas. Significant mitigation can be achieved during construction with thoughtful phasing, construction, and other programming. Design and project planning would be expected to occur in subsequent phases of project advancement, where an implementation strategy will be developed including a stakeholder engagement and communication plan, and a procurement process.

A non-prescriptive, performance-based procurement process presents opportunities for innovation in design and efficiencies in delivery by the private sector. This recommendation was echoed by the interview group where references to the Westbrook transit oriented development project along the West LRT line were made. Though the project was recognized as possibly the "only true transit oriented development project" in Calgary to date, the project is an example of an unsuccessful approach of leveraging private sector innovation. When the City first went to market with the Westbrook proposal, there were many prescriptions placed on the development scheme (i.e. construction timing, use and siting clauses). This became a major deterrent to the market, and before the project could take-off, the Calgary market began to experience its downturn. In some circumstances, a higher degree of specification is warranted for specific solutions (i.e. an iconic bridge, or a specific neighbourhood intervention).

Summary of Findings by Station Location

Figure 2 –Map of the 5 Future Green Line Stations in the City Centre Area

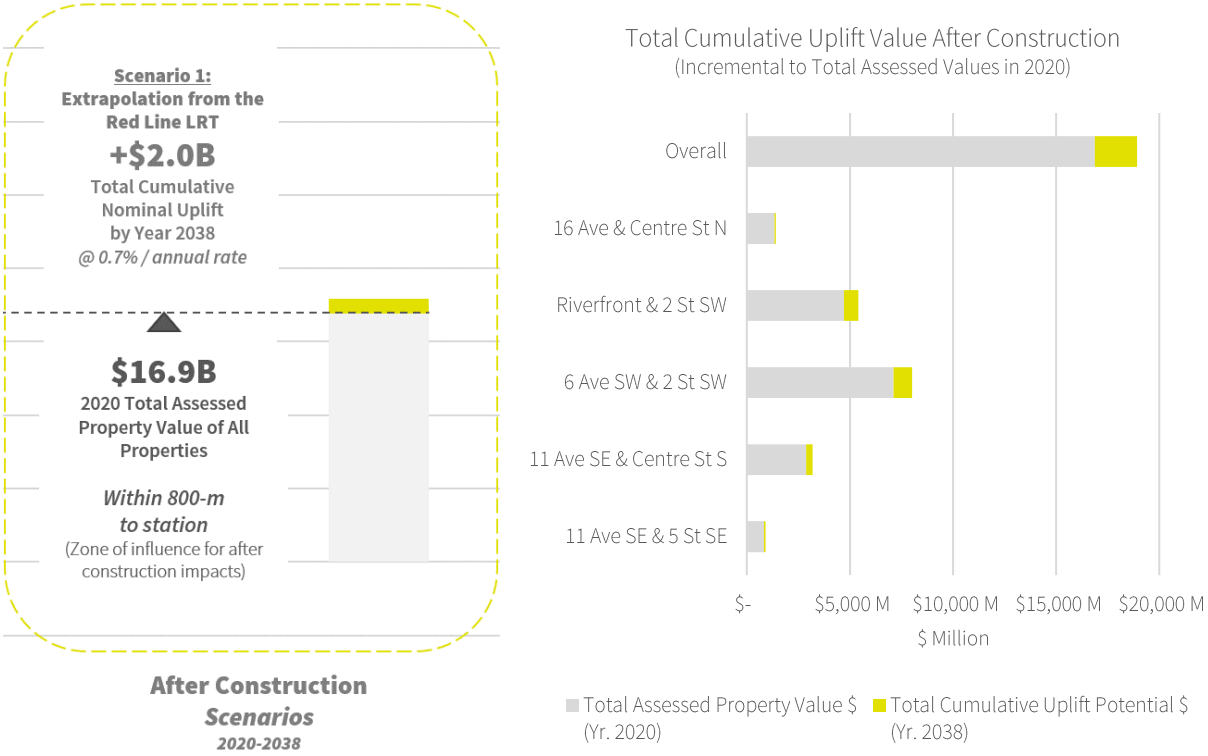


Anticipated in the near to medium term following the completion of the LRT, properties (in its current use) around the future stations at Riverfront & 2 Street SW and 6 Avenue SW & 2 Street SW are estimated to gain the greatest amount of uplift. This is because there is already a large base of high-value commercial properties in those areas today. (For reference, the combined assessed property value of these two station areas today is $11.8 billion.) Worth noting, uplift potential for commercial properties may be dampened given the current oversupply of office space and whether there may be enough demand in the future to absorb current vacancies and attract new investments. See Figure 2.

Anecdotally, interviewees for this study noted that construction disruptions would decrease the desirability for prospective tenants to sign or renew a lease, and that the probability of a lease renewal would decrease from about 75% to 50%. See Appendix C, Section vi.

[6] This 2017 Journal of Transport & Land Use Vol. 10 No. 1 "Open for business? Effects of LA Metro Rail construction on adjacent businesses"

Figure 3 – Property Value Impacts by Nearest Station for After Construction Scenario 1 (of 0.7% annualized rate of uplift)



In the longer term, properties that undergo intensification and/or change into higher-value uses will create the greatest amount of new value. This is in addition to the uplift in base value of the land lot at its current density and use today. The properties that are most likely to be redeveloped in this way will be properties that have little to no convenient rapid transit access prior to the Green Line; are of low built density and/or a lower value use than what the market would demand of it afterwards (e.g. parking properties). This redevelopment is likely if supported by municipal plans and policies. Properties around the future stations at 11 Avenue SE & 5 Street SE, Riverfront & 2 Street SW and 16 Avenue & Centre Street N fit this profile for additional development growth. These are the Beltline, Eau Claire/Chinatown, and Centre Street North corridor respectively.

Development viability for properties can be supported by concurrent land use and urban development planning initiatives, such as the anticipated new event centre and other development plans in the Beltline Area. Placemaking and urban design will help maximize future potential growth to property values by ensuring the new LRT is highly accessible to and from other amenities and last-mile destinations in the vicinity. Such efforts support the area's attractiveness and demand for space, helping to internalize the new transit benefits into premiums on price and rents. For more information, see *Appendix B – Economic Improvement Through Placemaking*.

Methodology Notes

It is difficult to isolate for property value changes due to the impacts of transit specifically, versus impacts due to an overall economic uplift in the same area. Often, transit investments happen in concert with other urban development effort, and the benefits are not realized many years later. The approach used in many of the case studies, including this report, examined changes in property value before and after major transit events. This was done to try to isolate for impacts due to transit versus other externalities, i.e. the opening of a station (to reflect the changes in transit access). Impacts to property values are also isolated by looking at areas that are within walking

distance to a station, versus areas that are not. If enough historical data is available, further empirical analysis can be used to validate whether transit access was the major driver behind property value changes, or whether it was due to other factors.

Further empirical analysis was possible for the Red Line case study and is what informs the extrapolated 0.7% in potential value uplifts year over year for the Green Line. It was confirmed that Calgary Red Line corridor impacts on property values were strongly influenced by how close the property was to a station compared to other characteristics including built density, building age and even neighbourhood. This is generally consistent with the findings in other literature and the case studies.

It was found that Calgary Red Line corridor impacts contributed to long-term, cumulative property value uplifts ranging up to 93% more than the median value, depending on the property's proximity to the station and its land use. At the same time, there were also negative impacts ranging down to -47%. See Table 2 below on how values have changed depending on the property's proximity to a Red Line LRT station and its land use.

Table 2 – Historical cumulative property value uplifts related to Calgary Red Line corridor impacts (1998-2016)

Proximity to Station (Travel Distance[1], metres)	**< 50**		**100**	**400**		**500**		**600**		**700**		**> 800**	
Land Use:	*Property Value Uplift %*												
Single-Residential	-6%	4%	4%	4%	4%	2%	2%	<1%	<1%	-2%	-2%	-3%	-3%	-5%
Multi-Residential	39%	20%	20%	16%	16%	8%	8%	6%	6%	5%	5%	4%	3%	2%
Office	69%	34%	34%	27%	27%	10%	10%	7%	7%	4%	4%	1%	1%	-2%
Retail	93%	11%	11%	-3%	-4%	-33%	-33%	-37%	-38%	-41%	-41%	-45%	-45%	-47%

Notes:

1. Distances to a station were determined in terms of actual travel (driving) distance and its straight-line distance utilizing a custom computer script in conjunction with Google Maps API.

While the data set presents a range of potential impacts specific to Calgary, property value uplifts appear to peak within a 500-metre distance to an LRT station. Beyond that distance, some land uses (i.e. office and multi-residential) maintain value uplift potential better than others. Other land uses (i.e. retail) are more sensitive to station proximity than others and may see their values underperform relative to the median value for their market if not located within a certain distance (for the Calgary Red Line this appears to be within 100-metres) relative to transit access.

Figure 4 – The Calgary Red Line LRT seen along the middle of Crowchild Train (Source: Lorraine Hjalte / Calgary Herald)

It should be recognized that the Red Line is quite different from the Green Line in some respects, and those differences may influence property value impacts. The majority of the Red Line is in the middle of Crowchild Trail, a very wide road, or along an existing rail corridor. In comparison, the Green Line will be the second rapid transit line in Calgary (after the West LRT/Blue Line Extension) to be located through and within urban communities—bringing transit closer and more accessible to people. Therefore, in comparison to the Red Line, there is likely to be greater property value uplift potential due to the Green Line's ability to better physically connect and integrate with its surroundings.

A final note on the potential 0.7% uplift is that it is an *upper bound estimate* of Scenario 1 (generated using historical Calgary property values related to Calgary Red Line corridor impacts). There is also a *lower bound estimate* of a 0.2% uplift year over year under the same method, when the potential uplift percentages for retail and office properties are taken as a blended average as one broad commercial category. (This would align with how property tax base is assessed in Calgary as either residential or non-residential categories.) In doing so, the uplift potential for office properties is dampened by the uplift potential for retail properties, which was found to be much more negatively impacting due to retail's uplift potential being highly dependent on its proximity to a transit station.

For example, within 800-metres to a station, retail properties may experience uplifts ranging from -47% to 93%, with impacts becoming negative once the property is beyond 100-metres to a station. On the other hand, office properties were found to experience positive uplifts generally throughout the 800-metres distance to a station, with less potential for negative impacts at an overall uplift range from -2% to 69%.

The 0.7% uplift estimate is likely a better reflection to how property values would be impacted as it would account for the nuanced variations to potential uplifts for office and retail properties respectively.

Given the above, a 0.7% uplift estimate should still be considered low and conservative. It can be reasonably assumed to be realized gradually in the long term over an 18-year period like the timeframe for the Red Line corridor impacts. Notably, the potential 0.7% uplift does not yet consider the anticipated role of city-shaping around the Green Line stations for the next generation of growth. When this happens, additional value will be created from new development on top of the base uplift in value of properties in its current condition. Additional value will be created from either the rezoning and/or intensification of the property into higher value and higher density development.

To better understand the range of potential impacts when other city-shaping factors and future development is considered, insights can be drawn from the case studies. The selected cases are relevant to the Green Line in terms of the technology of the transit system; design with nearby land uses and public spaces; the economic and market conditions prior to transit improvements; the timing of the improvements and reported impacts; and/or the spatial extent of the impacts (i.e. radius distance from a station). The potential 2.4% uplift generated from this approach is an average across the case studies and could be a better reflection of how property values may be uplifted in combination with other city-shaping forces including induced development growth seen in other cities.

Case Study Highlights

The case studies presented not only support expectations of property value impact, they also provide lessons learned in light rail implementation, including both of what has worked and what has not worked. The following highlighted case studies provide relevant lessons learned for the Green Line (and is an extension to the case study overview provided in Table 1):

- **Red Line LRT (Calgary, Canada):** As described above, this case is relevant and comparable to the Green Line because it is an example that is influenced by very similar economic, market and local conditions – the Red Line is in the City of Calgary. It is believed that the Green Line is likely to produce greater potential uplift because unlike the Red Line LRT, the Green Line is better positioned to physically connect and integrate with its surroundings. Lastly, the Red Line corridor impacts reflect changes to an already established transit corridor that underwent multiple extensions and thus construction periods. (The Red Line was first opened in 1981 and underwent multiple extensions from 2001- 2014. The analysis on Red Line corridor impacts examined data from 1998-2016.)
- **Confederation Line LRT (Ottawa, Canada):** The LRT design for this case involves both surface and undergrounds stations that require a portal tunnel within the street right-of-way. From 2008-2017, residential and commercial properties within an 800-metres radius distance to a station increased at 2.0% year over year. This occurred before the LRT project was announced, and through the design and construction stages. (The project was approved in 2012, construction began in 2013, and the system was first opened in 2019.) It is projected that values will increase further at a rate of 5 to 9% year over year from 2019-2021.
- **Canada Line Skytrain (Vancouver, Canada):** The design of this transit system involves an elevated guideway that crosses over rivers and other public areas as the line connects downtown Vancouver with the International Airport. Despite the elevated design in some locations, the study forecasted that residential and commercial land values within 300-metres to a station would increase at 3.0 to 3.5% year over year, excluding inflation, over a 30-year period. The line was first opened in 2009 and has experienced improvements to new stations as a result of integrated development.
- **Downtown Streetcar (Portland, US):** This is a case study where the municipality supported transit-oriented development through planning and policies, including financial incentives. From 1997-2008, residential and commercial properties within 300-metres to a station increased in value at 3.3% and 3.6% year over year, respectively. the streetcar system first opened in 2001 and underwent improvements through 2005-2007.

Below are other notable case studies that offer qualitative insights and other useful lessons related to how the Green Line may impact property values:

- **Metrorail (Buffalo, US):** The often-cited Buffalo Metro Rail LRT is an example of an underperforming LRT line that did not create the anticipated development needed to revitalize Buffalo's city centre and reverse the shrinking population. While light rail transit in Buffalo was perceived as a necessity for urban revitalisation and had sufficient political backing, the lack of a strong regional economy limited the potential of Metro Rail as a catalyst to revitalize downtown and neighbourhoods. When the economy recovered decades later, ridership has finally picked up.
- **Hudson-Bergen LRT (New Jersey, US):** The Hudson-Bergen LRT (HBLR) is an example where economic development has been spurred along the system's route, and new real estate markets can be established. The HBLR stations may have helped bring development into areas where office space developers otherwise would not have been attracted. Developers have also shifted away from stations from another transit line (the Port Authority Trans-Hudson, or PATH, train system) and are investing in properties along the light rail alignment.

For more information on the above and other case studies that have been reviewed for this report, see *Appendix D – Case Studies*.

Context Discussion: Early 2020 Global Events

Impacts from LRT construction are temporary, while property values due to transit proximity are long term. The benefits from transit will depend to some degree on the economic outlook for Calgary. In the frequently cited case of Buffalo, New York, its Metro Rail LRT project was not able to help reverse its region's economic conditions and so the potential upside from increased transit access was not able to be realized until over a decade later.

Calgary has not yet recovered from the downturn in the oil sector that began in 2014. The Conference Board of Canada's recent outlook for Calgary was positive, albeit moderate. For 2020 and beyond, the Board had predicted 2% annual GDP growth per year going forward.[7] CMHC's 2020 Rental Market Report for Calgary CMA expected labour market conditions in Calgary to continue to improve, which would help sustain rental demand in the residential markets. Rebound in the Calgary economy was visible in 2019: over 34,000 jobs were added within the first ten months of 2019, a 4.1% increase to the same period last year. Over 80% of those jobs were full-time positions, and employment levels among the age cohort of 15 to 24 increased 8.2%. Apartment vacancy rates remain at 4% at the end of 2019, with rents growing steadily in addition to new supply.[8]

Globally, more recent events of COVID-19 combined with oil production decisions in Saudi Arabia and Russia have combined to drive oil prices to historic lows, creating significant headwinds for the Calgary economy. Analysts around the world have adjusted economic outlooks globally to be very gloomy in the immediate term, with a high degree of uncertainty about when a "new normal" will return. It is too early and inappropriate to assess the immediate economic challenges and how they apply to the Green Line LRT corridor. It is also worth noting that city-shaping infrastructure projects like the Green Line LRT should not be planned in response to events that unfold in weeks and months. They are projects with impacts that span decades.

Therefore, despite significant immediate challenges, it is important to consider the longer-term trends globally that work in Calgary's favour: Canada has an enviable standard of living and is one of the more tolerant and pro-immigration societies in the world. Calgary is recognized for its high standard of living including proximity to the Rocky Mountains, and a highly educated workforce. Canada is perceived as a safe place for investment.

Given Canada's small population relative to much larger countries globally that will continue to export immigrants seeking the safety, security, and attractiveness of Canada, Calgary might be expected to be well-positioned to realize population growth aspirations despite immediate economic challenges. [9]

Given the foregoing, population and economic growth might be expected over the long term. Potential uplifts to property value due to improved transit accessibility, the benefits of urban agglomeration and subsequent future development growth around the LRT stations can be expected. Like any significant transit project, specific and targeted economic and planning strategies combined with improving economic conditions, should ideally be combined with transit planning and delivery to realize the full potential upside of the Green Line LRT.

Key Takeaways Going Forward:

[7] The Conference Board of Canada later revised its GDP growth figure for Calgary to negative 0.4% for 2019.
[8] Canada Mortgage and Housing Corporation (CMHC) 2020 Rental Market Report for Calgary CMA.
[9] For better access to jobs and overall mobility, many low wage workers and/or new immigrants tend to live near city centres. (Blumenberg and Hess, 2003; Hess, 2005) Although once the density of jobs decentralize (away from city centres), then the same group people were found to relocate to the suburbs.

1. **The Green Line LRT will provide improved rapid transit access and travel capacity into downtown Calgary where high-value employment is located**[10]**.** The downtown area, and the City of Calgary will benefit from the enhanced access and capacity of the new Green Line LRT. Light Rail given its permanence, can be expected to confidently signal to companies and investors that supporting the recovery and growth of Calgary's economy means increasing regional accessibility to, from and within the downtown commercial district.

2. **LRT can if planned, designed, and implemented well, contribute to inducing development and desirable community amenities. Development can be expected to occur in areas where the new LRT provides a sufficiently attractive change in access to people, property and businesses.** The Beltline and Centre Street North areas are considered noteworthy candidates for future growth. These areas represent an offering of urban neighbourhoods with good transit and walking, and fast transit access to Centre City amenities, leisure and work opportunities with the Green Line LRT. Benefits from induced growth will be additional to the growth in value of existing properties nearby to the future Green Line stations, making the case studies-generated, high property value increases more relevant and more comparable than the lower, Red Line analysis-generated property value increases.

3. **Achieving quality of design and integration of transit infrastructure with the public realm and adjacent development is necessary to maximize gains in property values.** The most effective way to design and integrate transit with its built environment is addressed at the neighbourhood level. Such as, how the LRT stations are designed and accessed; how the area around the station is well connected to other paths and amenities; and how the station and its area can become a hub for adjacent and nearby buildings that helps generate and guide foot traffic. To date the planning and design of the Green Line has been directed to, and set the stage for, success in integrated urban design. At this time, the specifics of these 'placemaking' impacts can only be reported on at a high-level while detailed design and implementation planning has not yet commenced.

[10] Urban growth and employment in Calgary are disproportionately downtown-focused compared to other major Canadian cities. Statistics Canada data shows that downtown Calgary used to be comparable with Ottawa and Winnipeg with approximately half of the employment is in the downtown area. From 1996 to 2016, Calgary experienced the largest suburbanization effect of any large Canadian city. An additional higher-order transit line could help refocus access (transit commuting rather than car commuting) and growth back to the downtown area and help maintain the core as a vibrant hub to access workers and ultimately achieve agglomeration and productivity benefits. Canadian city comparison from Statistics Canada. Source: Statistics Canada. https://www150.statcan.gc.ca/n1/pub/75-006-x/2019001/article/00008-eng.htm

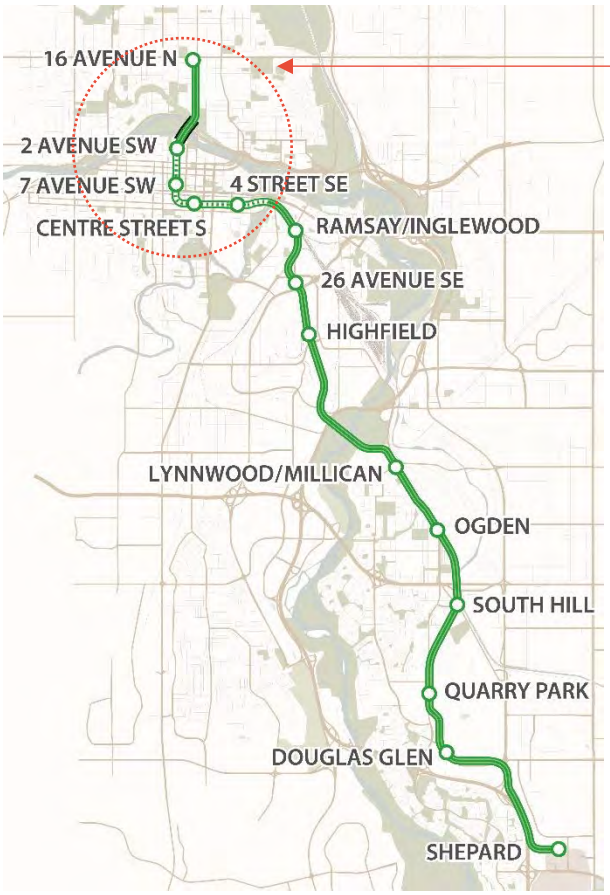
2.0 Introduction

The primary goal of public transportation investments is to improve urban mobility. It is well understood that transit projects can yield important economic benefits. Thus, along with mobility goals, economic development objectives frequently have influenced transit investment decisions, particularly new fixed-guideway systems. [11]

Geography

The City of Calgary is undertaking a major investment in its transit infrastructure: The Green Line LRT. This report considers the alignment between 16 Avenue N and the Elbow River at 11 Avenue SE. It includes a surface portion along Centre Street N, a bridge over the Bow River and a tunnel through the downtown. See Figure 5.

Figure 5 – Proposed Alignment for the Green Line LRT



Long-Term, Sustainable Impacts of Transit

Calgary's Market and Economy Today

Property values are influenced by several factors, including population growth, economic conditions, quality of life and nearby amenities.[12] In Calgary, property values are strongly related to an economy driven by its oil industry. Today, Calgary is experiencing a slow down in its economy, and is still recovering from the downturn in the oil sector that began in 2014.

According to the conference Board of Canada, the outlook for Calgary remains positive, albeit moderate. For 2020 and beyond, the Board predicts an upward of 2% annual GDP growth per year going forward.[13] Calgary's population is growing slower than the national average at an annual rate of 1.7% versus the 2.4% average. Recent City of Calgary economic forecasts

[11] Cervero, R., Aschauer, D., and the Transit Cooperative Research Program. Economic Impact Analysis of Transit Investment: A Guide for Practitioners. 1998. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_35.pdf
[12] Cervero, R and Duncan, M. Transit's Value-Added: Effects of Light and Commuter Rail Services on Commercial Land Values. Berkeley, CA. 2001.
[13] The Conference Board of Canada later revised its GDP growth figure for Calgary to negative 0.4% for 2019.

predict that this rate will remain over the next 5 years, stabilizing at around 1.4%.[14]

Figure 6 – Map of Calgary's Red, Blue and Green Line LRT

Labour market conditions in Calgary continue to improve, helping to sustain rental demand in the residential markets, according to CMHC's 2020 Rental Market Report for Calgary CMA. Over 34,000 jobs were added within the first ten months of 2019, a 4.1% increase to the same period last year. Over 80% of those jobs were full-time positions, and employment levels among the age cohort of 15 to 24 increased 8.2%. Apartment vacancy rates remain at 4% at the end of 2019, while rents grew steadily in addition to new supply.[15]

The slowdown of the oil economy through early 2020 is compounded by the COVID-19 pandemic and will likely lead to greater slowdown than previously predicted. The analysis for this report was done through December-February of 2020 based on information collected that is recent to December 2019. It does not take into account the immediate economic conditions or the impacts of the pandemic. The Canadian economy, including Alberta, the oil and gas sector, and Calgary will evolve into a new normal as more information becomes available to the public over the next weeks and months on the economic impact of COVID-19.

Generating New Markets

Calgary's concentration of historically high income jobs performed by relatively highly educated workers within its downtown core may be one of its greatest advantages. Its established LRT system attract relatively high ridership levels for a city of its size. The Green Line LRT will connect Calgary's north and south neighbourhoods to its downtown core. These are neighbourhoods that have yet to be connected to rapid transit, serving areas of the city that are not yet well served by rapid transit.

Connecting Talent, Homes and Jobs

Through this new north-south connection, talent and jobs will be better connected and additional economic activity will be stimulated in the central business district. In the process of doing this, The City will be able to promote more TOD investment along rapid transit lines and help its city region grow in a sustainable way for future generations.

The demand for proximity to stations starts with workers, specifically younger generations (i.e. millennials) who want to be near transit because they often do not have (access to) a car. Research shows that millennials prefer to hold off or avoid buying cars and therefore prefer access to city centres and jobs via good transit.[16] Property owners

[14] City of Calgary. Calgary and Region Economic Outlook (2019-2024). Accessed January 15, 2020.
[15] Canada Mortgage and Housing Corporation (CMHC) 2020 Rental Market Report for Calgary CMA.
[16] In addition to this, Calgary no longer has access to Car Share memberships (i.e. Car2Go) and this is creating more demand for public transportation options, according to City staff.

want their properties to be occupied and in demand, and so position their real estate to meet the needs of these companies and millennials, driving up property value.[17]

Other types of rider profiles, such as retirees, may benefit from and choose the access and reduced dependence on car use that transit can afford. There are a variety of different customers across age, sex, and lifestyle demographics that benefit from transit.

Return on Transit Investment

To maximize return on transit investment, the different layers of a city need to be integrated. It is both a common principle and reflected in the selected case studies that new rail investment, by themselves, do not automatically translate into significant land-use changes.[18] Transit is a long-term investment that ideally has high levels of integration with its immediate environment of buildings, parks, and other connections and destinations.

As Calgary adapts to a rapidly changing local and global economy, a long-term investment in its transit infrastructure will shape future development and provide residents and workers more options on where they can live and work. It will also confidently signal to companies and investors that supporting the recovery and growth of Calgary's economy means increasing regional accessibility to, from and within the downtown commercial district.

Context Discussion: Early 2020 Global Events

Impacts from LRT construction are temporary, while property values due to transit proximity are long term. The benefits from transit will depend to some degree on the economic outlook for Calgary. In the frequently cited case of Buffalo, New York, its Metro Rail LRT project was not able to help reverse its region's economic conditions and so the potential upside from increased transit access was not able to be realized until over a decade later.

Calgary has not yet recovered from the downturn in the oil sector that began in 2014. The Conference Board of Canada's recent outlook for Calgary was positive, albeit moderate. For 2020 and beyond, the Board had predicted 2% annual GDP growth per year going forward.[19] CMHC's 2020 Rental Market Report for Calgary CMA expected labour market conditions in Calgary to continue to improve, which would help sustain rental demand in the residential markets. Rebound in the Calgary economy was visible in 2019: over 34,000 jobs were added within the first ten months of 2019, a 4.1% increase to the same period last year. Over 80% of those jobs were full-time positions, and employment levels among the age cohort of 15 to 24 increased 8.2%. Apartment vacancy rates remain at 4% at the end of 2019, with rents growing steadily in addition to new supply.[20]

Globally, more recent events of COVID-19 combined with oil production decisions in Saudi Arabia and Russia have combined to drive oil prices to historic lows, creating significant headwinds for the Calgary economy. Analysts around the world have adjusted economic outlooks globally to be very gloomy in the immediate term, with a high degree of uncertainty about when a "new normal" will return. It is too early and inappropriate to assess the immediate economic challenges and how they apply to the Green Line LRT corridor. It is also worth noting that city-shaping infrastructure projects like the Green Line LRT should not be planned in response to events that unfold in weeks and months. They are projects with impacts that span decades.

Therefore, despite significant immediate challenges, it is important to consider the longer-term trends globally that work in Calgary's favour: Canada has an enviable standard of living and is one of the more tolerant and pro-

[17] Marr, G. (2015). Financial Post. Toronto property near public transit worth 30% more than other buildings, study finds. Accessed February 2020.
[18] Bernick, Michael and Cervero, Robert. Transit Villages in the 21st Century. Reviewed by Bianco, Martha J. April 1998.
[19] The Conference Board of Canada later revised its GDP growth figure for Calgary to negative 0.4% for 2019.
[20] Canada Mortgage and Housing Corporation (CMHC) 2020 Rental Market Report for Calgary CMA.

immigration societies in the world. Calgary is recognized for its high standard of living including proximity to the Rocky Mountains, and a highly educated workforce. Canada is perceived as a safe place for investment.

Given Canada's small population relative to much larger countries globally that will continue to export immigrants seeking the safety, security, and attractiveness of Canada, Calgary can be expected to be well-positioned to realize population growth aspirations despite immediate economic challenges.

Given the foregoing, population and economic growth might be expected over the long term. Potential uplifts to property value due to improved transit accessibility, the benefits of urban agglomeration and subsequent future development growth around the LRT stations can be expected. Like any significant transit project, specific and targeted economic and planning strategies combined with improving economic conditions, should ideally help realize the full potential upside of the Green Line LRT.

3.0 Purpose of Study

The City of Calgary retained Hatch to study the impact on properties from the proposed Green Line LRT, during and after construction. Based on a literature review, local expert interviews, case studies and historical data; the team has projected potential property value impacts over the long-term following the anticipated completion of the project. The City wants to understand this impact primarily in terms of a net gain or loss to its property tax revenue base.

The following questions were additionally considered to better inform the proforma estimation on property value impacts:

- What is the differentiated impact between a surface versus an underground transit system, if any?
- What is the extent of the impact, and are specific areas impacted disproportionately?
- What is the effect on future development activity (i.e. will there be further induced development, or will plans be deferred to later stages)?

To begin the study, the team identified and later consulted with local Calgary real estate professionals on the types of impacts to properties (and their value). It was agreed these were the following impacts to properties and their valuation in Calgary: accessibility, transit design, visibility and station proximity.

Of highest concern to the industry is accessibility for building users, from the perspective of the property owner; and how the transit system is designed in relation to adjacent buildings and streetscapes.

4.0 Methodology and Assumptions

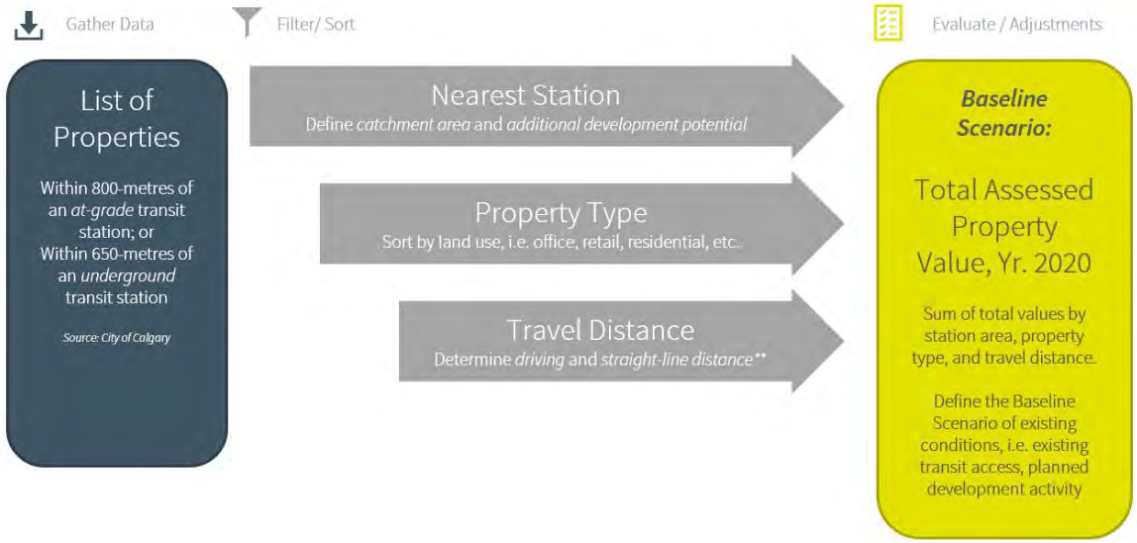
Two methods were used to determine impacts. One method ('Scenario 1') looked at historical Calgary property values related to Calgary Red Line corridor impacts and generated a low, or conservative outcome for the Green Line: 0.7% property value increase year over year. A second method ('Scenario 2') looked at relevant non-Calgary case studies and generated a higher, more optimistic outcome: 2.4% year over year. Both the low and high potential outcomes are relative to what property values would have otherwise been without the Green Line LRT.

It is difficult to isolate for property value changes due to the impacts of transit specifically, versus impacts due to an overall economic uplift in the same area. Often, transit investments happen in concert with urban development efforts, and the benefits are realized until many years later. The approach used in many of the case studies, including this report, examined changes in property value before and after major transit events. This was done to try to isolate for impacts due to transit versus other externalities, i.e. the opening of a station (to reflect the changes in transit access). Impacts to property values are also isolated by looking at areas that are within walking distance to a

station, versus areas that are not. If enough historical data is available, further empirical analysis can be used to validate whether transit access was the major driver behind property value changes, or whether it was due to other factors.

Further empirical analysis was possible for the Red Line case study and is what informs the extrapolated 0.7% in potential value uplifts year over year for the Green Line. It confirmed that Calgary Red Line corridor impacts on property values were strongly influenced by how close the property was to a station compared to other characteristics including built density, building age and even neighbourhood. This is generally consistent with the findings in other literature and the case studies. See *Appendix A – Detailed Methodology and Assumptions for 'Scenario 1' – Calgary Red Line Corridor Impacts.*

Figure 7 – Flowchart diagram of how the baseline is established



The followings steps were taken to estimate for impacts:

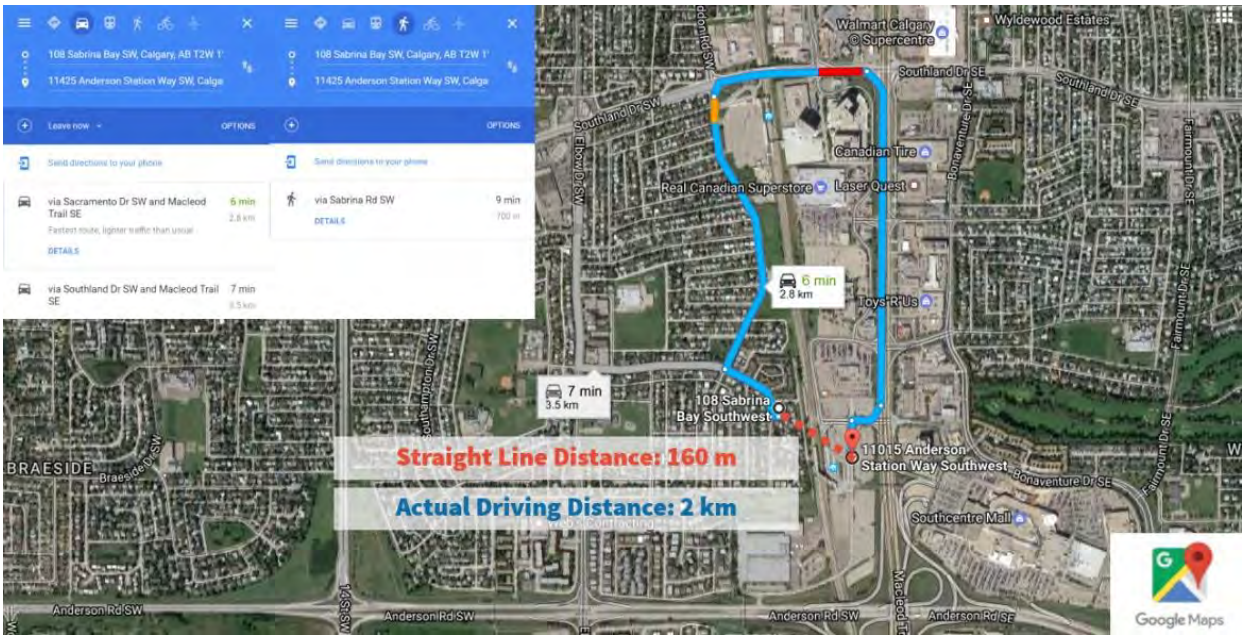
1. Establish a baseline for today, 2020, by gathering data on the history of taxation revenue in terms of assessed property value (an amount used to determine the tax revenue base) for properties that will be nearby the five future Green Line stations within a defined area. Property data was provided by the City of Calgary including information on total assessed property values for year 2020 and land use. The data was then sorted and culled by characteristics that are indicative of potential impacts to property values due to transit-related characteristics (i.e. catchment areas, nearest station, travel distance to station, and property type). The *sum of the total assessed property value* of all the properties becomes the *baseline* for this study.

Figure 8 – Diagram of catchment area

The catchment area for surface stations and underground is defined differently. Surface stations are defined by an 800-metres travel distance; while underground stations are defined by a 650-metres distance. Underground stations have less catchment area than surface stations because of the additional travel distance required by underground stations (i.e. vertical circulation up and down). Although this also assumes that vehicle speeds and travel times are equal. This is because underground stations usually result in faster trip times, which means that the relative attractiveness of the service is greater and so there is a counterbalance to the reduced catchment because of increased access time and distance.

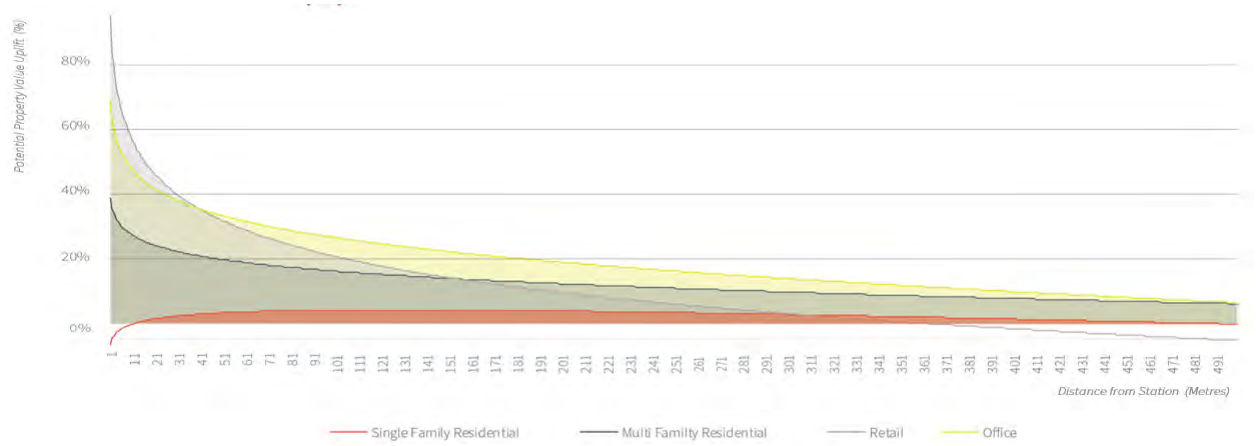
Since property values are driven by how accessible it is to transit, distances to a station were determined in terms of *actual travel distance* and its *straight-line distance* utilizing a custom computer script in conjunction with Google Maps API. To understand the difference between actual travel distance (i.e. driving and walking distance) and straight-line distance (i.e. the typical radius distance from a station that defines a station catchment area in plans and policies), see Figure 9 for an example.

Figure 9 – Determining a Property's Proximity and Access to its Nearest Station



2. Generated a 0.7%, year over year, estimate in potential uplifts by looking at historical Calgary property values related to Calgary Red Line corridor impacts. 'Scenario 1'. The selected properties from step 1 are assigned a potential percentage change to its value according to the historical trends from the Red Line LRT. See Figure 10 for the range of potential percentage changes to property value depending on the property's land use and proximity to an LRT station. See Figure 11 for an example to how the trends for multifamily properties would be applied to the properties nearby the Green Line.

Figure 10 – Calgary Red Line corridor impacts on property value by land use and station proximity (cumulative percentage change from 1998-2006)



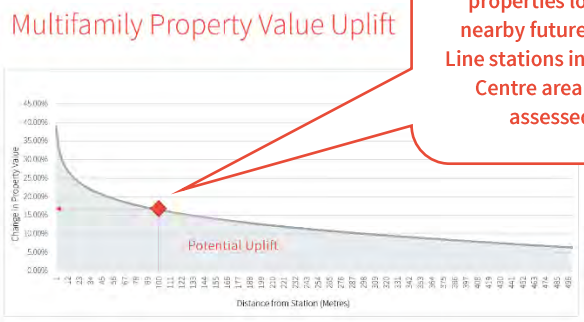
Proximity to Station (Travel Distance, metres)	**< 50**		**100**		**400**		**500**		**600**		**700**		**> 800**	
Land Use:	*Property Value Uplift %*													
Single-Residential	-6%	4%	4%	4%	4%	2%	2%	<1%	<1%	-2%	-2%	-3%	-3%	-5%
Multi-Residential	39%	20%	20%	16%	16%	8%	8%	6%	6%	5%	5%	4%	3%	2%
Office	69%	34%	34%	27%	27%	10%	10%	7%	7%	4%	4%	1%	1%	-2%
Retail	93%	11%	11%	-3%	-4%	-33%	-33%	-37%	-38%	-41%	-41%	-45%	-45%	-47%

Figure 21 – Applying the Effects of the Calgary Red Line LRT to Estimate Impacts due to the Green Line

Example Subject Property

(Being assessed for potential impacts due to the Green Line LRT)

- Inputs:
  - Property Use = Multi-Residential
  - Actual Travel Distance = 100-metres
  - 2020 Assessed Property Value = $1 million
- Outputs:
  - Potential Property Value Uplift % = 17%
  - Potential Property Value Uplift $ = $1 million x 17% = $170,000
  - Potential Total Property Tax Rate for Residential Class Properties = 0.67%
  - Potential Property Tax Revenue Surplus = $1,131



Each of the 15,000+ properties located nearby future Green Line stations in the City Centre area were assessed.

Figure 12 – Flowchart diagram of how impacts to property value and tax revenue estimated for Scenario 1

3. Generated a 2.4%, year over year, estimate in potential uplifts as an average across select, comparable case studies. 'Scenario 2'. Case study findings are adjusted into annualized rates of uplift, and only if applicable to residential and commercial properties. The estimates from Scenario 2, alongside the estimates from Scenario 1 are used as the overall range to potential impacts for the Green Line study.

Figure 33 – How the estimates from Scenario 1 and 2 will be compared

Approach	Project	Key Indicators			
Projection Extrapolation of historical trends observed from the Red Line, also for an 18-year period following completion of Green Line	**Green Line LRT** Calgary, Canada	**Total Cumulative Uplift** %	**Time Period** Years	**Impact Area** Metres to a station	**Annual Rate** %
Historical Historical trends observed from the Red Line between 1998-2016 (an 18-year period)	**Red Line LRT** Calgary, Canada				
Historical Historical real estate price changes reported across case study literature	**Canada Line SkyTrain** Vancouver, Canada				
	Confederation Line LRT Ottawa Canada				
	Portland Streetcar Portland, US				

Estimated Ranges of Potential Impacts

To note, the potential 0.7% uplift is an *upper bound estimate* of Scenario 1 (generated using historical Calgary property values related to Calgary Red Line corridor impacts). There is also a *lower bound estimate* of a 0.2% uplift year over year under the same method, when the potential uplift percentages for retail and office properties are taken as a blended average as one broad commercial category. (This would align with how property tax base is assessed in Calgary as either residential or non-residential categories.) In doing so, the uplift potential for office

properties is dampened by the uplift potential for retail properties, which was found to be much more negatively impacting due to retail's uplift potential being highly dependent on its proximity to a transit station.

For example, within 800-metres to a station, retail properties may experience uplifts ranging from -47% to 93%, with impacts becoming negative once the property is beyond 100-metres to a station. On the other hand, office properties were found to experience positive uplifts generally throughout the 800-metres distance to a station, with less potential for negative impacts at an overall uplift range from -2% to 69%. For a more detailed explanation, see *Appendix A – Detailed Methodology and Assumptions for 'Scenario 1' – Calgary Red Line Corridor Impacts*.

The 0.7% uplift estimate is likely a better reflection to how property values would be impacted as it would account for the nuanced variations to potential uplifts for office and retail properties respectively. Finally, it can be reasonably assumed that the uplifts could be realized gradually in the long term over an 18-year period like the timeframe for the Red Line corridor impacts.

Green Line's Comparability with the Red Line – 'Scenario 1'

With this approach, estimates reflect potential outcomes within the context of Calgary's market and economic conditions. It is assumed that similar market drivers will be in effect when projecting forward for the Green Line.

It should be recognized that the Red Line is also quite different from the Green Line, and those differences do influence property values. The majority of the Red Line is located down the middle of Crowchild Trail, a very wide road, or along an existing rail track further down south. In comparison, the Green Line will be the second rapid transit line in Calgary, after the West LRT, to be located through and within urban communities—bringing transit closer and more accessible to people. Therefore, in comparison to the Red Line, there is likely to be greater property value uplift potential due to the Green Line's ability to physically connect and integrate better with its immediate physical surroundings.

Estimates generated from Calgary Red Line corridor impacts from 1998-2016 reflect *an established and expanding (Red Line) LRT system.* During this 18-year period, the Red Line system underwent multiple service enhancements and network extensions with additional new stations (and as such, multiple construction periods). The Red Line was initially approved in 1976 and opened in 1981.

Scenario 1's 0.7% uplift estimate should still be considered low and conservative, because it is based on how properties are currently built and used today. The potential 0.7% uplift does not yet consider the anticipated role of city-shaping around the Green Line stations for the next generation of growth. When this happens, additional value will be created from new development on top of the base uplift in value of properties in its current condition. Additional value will be created from either the rezoning and/or intensification of the property into higher value and higher density development.

Green Line's Comparability with the Case Studies – 'Scenario 2'

To better understand the range of potential impacts when other city-shaping factors and future development is considered, insight can be drawn from the case studies. The cases here were selected because they were seen as comparable and relevant to the Green Line. Specific ways in which they are similar is: technology of the transit system; general urban design of nearby land uses and public spaces; similar markets and economic conditions prior to transit improvements; the timing of the improvements and reported impacts; and/or the spatial extent of the impacts (i.e. radius distance from a station). They are all North American, and reasonably recent and have citeable research. They are all also in relatively mature urban markets. The potential average 2.4% uplift seen is an average across the relevant case studies and could be a better reflection of how property values may be uplifted in combination with other city-shaping forces.

When properties undergo zoning changes to allow higher value and higher density development *additional* value will be created from the step-change in permitted use (if there is a market to take advantage of the change in permitted uses). For example, in several Canadian urban property markets the highest and best use is high-density residential. Where sites are zoned employment, there can be a step-change increase in property value upon re-zoning to high density residential.

'Scenario 1' and 'Scenario 2' set good and fair low and high bounds to what property impacts could be reasonably seen in Calgary.

Interviews with Local Calgary Real Estate Professionals

To augment the research, the team conducted interviews with local Calgary real estate investors, brokers and valuation appraisers to provide additional perspective on the current and potential impacts of the planned Green Line LRT. Each interviewee was asked the following questions:

- What are the types of transit-related impacts to properties?
- Have property values been impacted since the Green Line's announcement and funding commitments?
- Is there a price premium for properties that exist along an LRT corridor today?
- Is there more market demand for development along an LRT corridor versus a corridor without?
- Has development activity slowed down because of the Green Line LRT project?
- Can property values be negatively impacted by the design of the LRT system?
- Are businesses and tenants able to 'weather the storm' during station construction?

See *Appendix C – Interview with the Calgary Property Industry*.

5.0 Understanding the Impacts of LRT on Property Value

It is worth noting that transit's effects on land values and rent premiums can be difficult to isolate from other market forces. In North America alone, over 100 studies have sought to capture the relationship between rapid transit and land values, with mixed results.[21] Hess and Almeida (2013) argue that the varying magnitude of previous mass transit research is "sometimes contradictory and unique to a given locale and does not provide a firm basis to judge future impacts." Existing policy and decision-making as well as economic conditions often contribute to and impact the outcome of alignment options for urban mass transit, as well.[22]

5.1 Types of Impacts

Transit Characteristics that affect Property Value

One common outcome remains true: proximity to mass transit service generally leads to an increase in property values in the long-term. Travel time and reliability benefits from transit are effectively internalized into property values. There is value from faster and more reliable access to key destinations. Other factors that also influence how transit will impact property value are the locational characteristics of the station area, the socio-economic characteristics of transit users, and how the transit system is designed to be integrated together with its

[21] Higgins, C., & Kanaroglou, P. (2018). Rapid transit, transit-oriented development, and the contextual sensitivity of land value uplift in Toronto. Urban Studies, 55(10), 2197–2225.
[22] International Tunneling Agency. (2004). Underground or aboveground? Making the choice for urban mass transit systems. Tunneling and Underground Space Technology, 19, pg. 3-28

community.[23] It will be the combined layering of all these factors to enable properties to capture its full uplift potential. This speaks to the importance and opportunity of good planning, urban design, market awareness and in some cases partnership, and overall execution of transit and city-building.

Variations in Impacts are Hyper-Local, and Design-Specific

It has been demonstrated in different ways across the various case studies that proximity to an LRT station increases property values. Tables 3 and 4 provide a high-level summary of the range in potential long-term impacts of mass transit systems on property values, which varies by the property's land use, proximity to a station or the right-of-way, and the type of transit.[24] There is a fundamental difference between a property being within walking proximity to a transit station, versus simply being close to the transit line (and actually have no easy-walking access to a station.)

Table 3: Different Types of Mass Transit's Impact onto Property Values by Proximity to Stations

Transit Type	Bus	BRT	LRT (surface)	LRT (grade separated)	Subway	Commuter Rail
Proximity to Station (Radius Distance, metres)	**100**	**400**	**500**	**600**	**800**	**800**
Land Use:	*Property Value Uplift %*					
Residential	1-2%	2-4%	10-25%	1-30%	20-50%	20-50%
Office	1-2%	2-4%	10-50%	15-50%	20-50%	20-50%
Retail	1-2%	1-2%	10-50%	10-50%	7-15%	7-15%
Industrial	0-1%	0-2%	1-2%	1-2%	5-5%	5-5%

Table 4: Different Types of Mass Transit's Impact onto Property Values by Proximity to Right-of-Way

Transit Type	Bus	BRT	LRT (surface)	LRT (grade separated)	Subway	Commuter Rail
Proximity to Right-of-Way (Radius Distance, metres)	**100**	**400**	**500**	**600**	**800**	**800**
Land Use:	*Property Value Uplift %*					
Residential	-	-	-10 to 0%	-15 to -5%	-	-15 to -5%
Office	-	-	-10 to 0%	-15 to 0%	-	0-10%
Retail	-	-	5-10%	5-10%	-	0-10%
Industrial	-	-	0-1%	0-1%	-	-

In a 2015 study by Avison Young, downtown Toronto commercial properties that were located within 500-metres to a subway station, sold for 30% more per square foot than comparable properties located further away. [25] In a 2009 study by The Brookings Institute, commercial property value assessments in Downtown Portland, US grew by 231%, from 1997 to 2008 (11 years)—outpacing the city average of 130%. This equals to about a 3.6% annual growth premium. Similarly, for multi-family homes, values increased by 205%, versus the city average of 118%, or an annual growth premium of 3.3%. The same study also looked at the Hudson-Bergen LRT (HBLRT) in New Jersey, US. Residential properties located within 400-metres of a station achieved an annual rate of price appreciation that was

[23] Dube, J. et al. Commuter rail accessibility and house values: The case of the Montreal South Shore, Canada, 1992–2009. Journal of Transportation Research. February 2013.
[24] Metrolinx. Business Case: Sheppard-Finch LRT. 2009.
[25] Avison Young. Making the connection: Subway proximity offers multiple benefits for Downtown Toronto office buildings. 2015.

17-20% higher than comparable, less transit-accessible residential properties. However, price appreciation was found to be negligible within the HBLRT station areas that were already well served by transit.[26]

A multi-city and multi-study review conducted by PriceWaterhouse Coopers in 2001 found that residential properties near a station see a positive premium of 0-5% following the arrival of a transit system. The premium is highest for those properties located between ¼ to 1 mile (400 to 1,600-metres) from a station. For instance, it was found that residential properties located immediately along the rail corridor had a potential negative valuation of 5-10%—likely due to the externalities like increased noise and vibration when living next to the rail corridor and its infrastructure. Thus, some property owners benefit from a public transit project while others will not.[27]

Transit accessibility plus good urban design is what creates value. This means accessibility that is gained by proximity to station entrances, stops, and transfer points; and not just simply along the transit route. For this reason, proximity to a rail line simultaneously generates negative and positive impacts.[28]

Table 5 – Historical cumulative property value uplifts related to Calgary Red Line corridor impacts (1998-2016)

Transit Type	Red Line LRT (a combination of surface and underground stations)													
Proximity to Station (Travel Distance[1], metres)	**< 50**		**100**		**400**		**500**		**600**		**700**		**> 800**	
Land Use:	*Property Value Uplift %*													
Single-Residential	-6%	4%	4%	4%	4%	2%	2%	<1%	<1%	-2%	-2%	-3%	-3%	-5%
Multi-Residential	39%	20%	20%	16%	16%	8%	8%	6%	6%	5%	5%	4%	3%	2%
Office	69%	34%	34%	27%	27%	10%	10%	7%	7%	4%	4%	1%	1%	-2%
Retail	93%	11%	11%	-3%	-4%	-33%	-33%	-37%	-38%	-41%	-41%	-45%	-45%	-47%
Avg. of all Property Types	49%	17%	17%	11%	11%	-3%	-3%	-8%	-8%	-9%	-9%	-11%	-11%	-13%
Avg. of all Residential	17%	12%	12%	10%	10%	5%	5%	6%	6%	2%	2%	1%	0%	-2%
Avg. of all Commercial	81%	23%	23%	12%	12%	-12%	-12%	-15%	-16%	-19%	-19%	-22%	-22%	-25%

Notes:

1. Distances to a station were determined in terms of actual travel (driving) distance and its straight-line distance utilizing a custom computer script in conjunction with Google Maps API.

Findings are generally consistent with what has been observed in the City of Calgary. Table 5 summarizes the long-term historical transit premiums that have occurred due to the Calgary Red Line. The premiums also varied by land use and proximity to stations. While the data set presents a range of potential impacts specific to Calgary, property value uplifts appear to peak within a 500-metre distance to an LRT station. Beyond that distance, some land uses (i.e. office and multi-residential) maintain value uplift potential better than others. Other land uses (i.e. retail) are more sensitive to station proximity than others and may see their values underperform relative to the median if not located within a certain distance (within 100-metres for Calgary) relative to transit access.

[26] Brookings Institution, HDR, Reconnecting America, RCLCO. Value Capture and Tax-Increment Financing Options for Streetcar Construction. 2009.
[27] Wayland, S. The Impact of Light Rail Transit on Low-Income Households and Neighbourhoods. 2011.
[28] Kilpatrick, J. et al. (2007). The Impact of Transit Corridors on Residential Property Values. Journal of Real Estate Research. February 2007.

Impacts are not Equally Distributed

Not all impacts are equally distributed. Some impacts are felt locally, some regionally, some impact the economy, and some impact the community. Robert Cervero, a leading consultant in transportation policy and planning, as part of the Transit Cooperative Research Program, assembled the 'Guidebook for Practitioners' with the primary objective of "identifying and describing a broad array of predictive and evaluative methods used to conduct economic impact analysis of public transportation investments".[29]

Table 6: Categories of Transit-Related Economic Impacts

Generative Impacts	Redistributive Impacts	Financial Transfer Impacts
User Benefit (i.e. travel time savings, safety benefits, changes in operating costs)	Land development (i.e. clustered development around transit stations)	Employment and income growth related to system construction, operations or maintenance
Employment and income growth unrelated to system construction, operation, or maintenance	Employment and income growth due to land development	Joint-development income to local agencies
Agglomeration / urbanization benefits (i.e. higher productivity, lower infrastructure costs)	Increased economic activity within the corridor	Property tax impacts
External benefits (i.e. air quality)		
Accessibility benefits (i.e. access to employment)		
Reduced development cost due to reduced parking		

The research categorizes the transit impacts in the following way:

1. **Generative Impacts** produce net economic growth and benefits in a region such as travel time savings, increased regional employment and income, improved environmental quality, and increased job accessibility.
2. **Redistributive Impacts** account for locational shifts in economic activity within a region such that land development, employment, and therefore income occur in a transit corridor or around a transit stop, rather than being dispersed throughout a region.
3. **Transfer Impacts** involve the conveyance or transfer of funds from one entity to another such as the employment stimulated by the construction and operation of a transit system financed through public funds, joint development income, and property tax income from development redistributed to a transit corridor.

[29] Cervero, R., Aschauer, D., and the Transit Cooperative Research Program. *Economic Impact Analysis of Transit Investment: A Guide for Practitioners.* 1998. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_35.pdf

For the City of Calgary's focus on real estate impacts and property tax implications, of interest would be Redistributive and Transfer Impacts. These two impact categories "tend to be less data intensive, less sophisticated, and more qualitative than the Generative Impacts. Although each method is described separately, they are typically used in combination to enhance the overall economic analysis." The Hatch team has taken a combined approach for this study, using both historical data that is specific to the Calgary market as well as a qualitative examination through literature review and interviews with the local real estate industry members.

Impacts on Future Development

New LRT stations were found to create market demand for certain real estate products that would have otherwise not been viable. Underutilized land around stations are converted and redeveloped into higher-and-better uses, often with compact, pedestrian-friendly, mixed-use developments that would have not otherwise been supported by a local road network.

The Vancouver Canada Line within the City of Surrey is a light rail line that attracted investment in the city centre, generating higher-value jobs and diversifying the city's labour force over the next 30 years. There will also be more rapid development of real estate in the vicinity of the transit stations, which result in higher property taxes.[30]

In a 2005 study for the City of Ottawa regarding the Confederation Line LRT, development opportunities within a 400-metres radius around stations were examined. Without an LRT, the area would receive 5.3% of the city's annual 1 million square metres of new development. But with the presence of LRT, this share would increase by 20% to around 6.4%.[31]

Areas around the MAX LRT stations (in Portland, US) have also seen an increase in density. The rate of development within Blue Line station areas were 69% higher than elsewhere within a one-mile (1,600-metres) corridor extending along the light rail alignment. Low to mid-value properties within the station areas redeveloped at twice the redevelopment rate reported for low value properties outside of station areas.[32]

When properties are zoned for higher value and higher density development due to increased transit capacity, *additional* value will be created from the higher-valued land.

Although plans for the Green Line LRT are approved and project funding for Stage 1 is committed by all three levels of Government, market confidence in the project will be unsteady until the transit is in-service. Other projects have a good level of confidence that they will be delivered because there is a high degree of consensus about the project being delivered and how it will be delivered. The Green Line, due to its planning iterations, may suffer from a lack of public and market confidence and therefore business and development decisions will wait until substantial construction is underway.

5.2 Timing of Impacts

Timing of Impacts (Benefits and Losses) vary by the End User

Although there will generally be a positive uplift to property values in the long term, how values are impacted in the short- and medium-term during station construction is less predictable. Whether property values are anticipated to

[30] Avison Young. Unlocking Generational Aspirations: A Commercial Real Estate Perspective on Public Transit & Transportation Infrastructure Investment in Metro Vancouver. June 2015
[31] 2005. City of Ottawa. Strategic Assessment: North-South Light Rail Value Uplift and Capture Value-Uplift Study for the Confederation Line LRT.
[32] https://trimet.org/pdfs/publications/Livable-Portland.pdf

change in a positive or negative way, will depend on from who's perspective we take between the landowner and the business tenants.

For a business tenant, there may be temporary negative impacts due to station construction and result in business revenue loss. Negative impacts to tenants during construction would include increased noise, vibration and dust; decreased accessibility, visibility and an overall lack of pedestrian-friendliness, which would decrease footfall and consumer spending. During this time, landowners may have a more difficult time ensuring their property is occupied and will need to invest more in efforts in attracting and retaining tenants.

Timing of Impacts vary by Market Confidence in the Design and Delivery of LRT

Property values during construction are more likely to reflect the market's confidence in the design and actual delivery of the new LRT project. Adverse effects due to construction disturbance can be mitigated by focusing on the overall delivery and implementation of the new Green Line (for example, speed of delivery, minimizing disturbance, and instituting mitigative programming such as communications and marketing for impacted businesses, etc.).

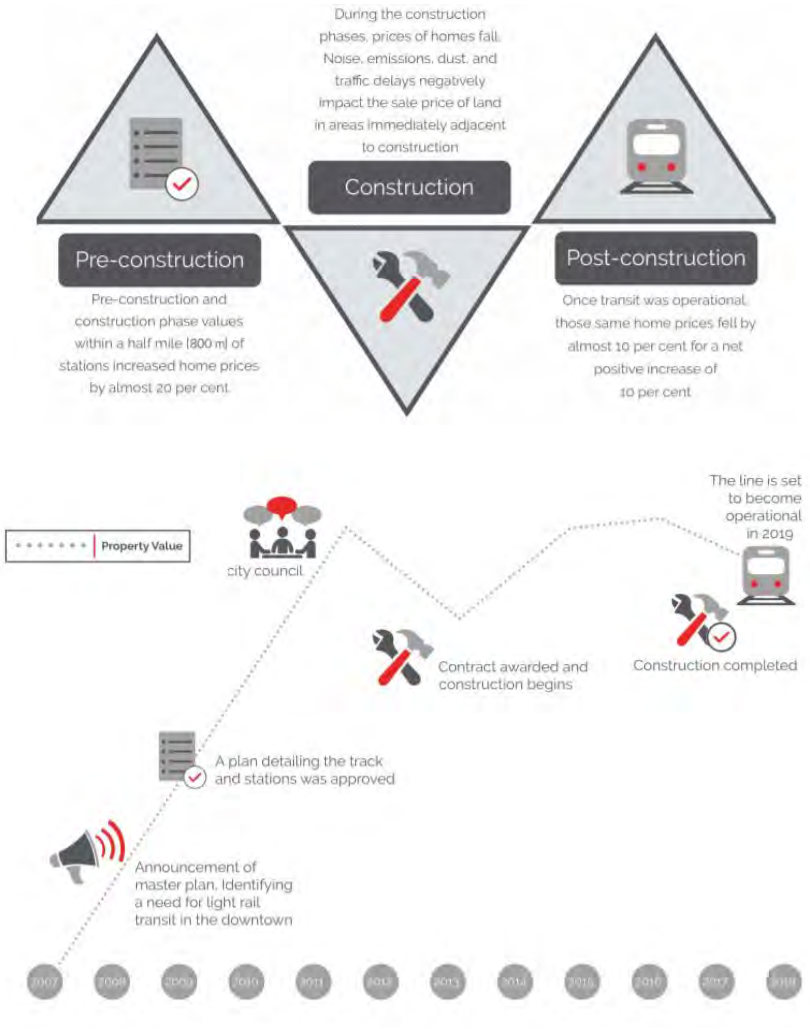
Property values in high growth metros are typically impacted immediately upon announcement of major transit projects. As the project undergoes planning and design, and market signals to the project's progress becomes more clear, property value uplifts have been observed to continue to increase as the project reduces in uncertainty and risk. Pre-construction stage is a volatile period for property values due to market speculation and project uncertainty. The rate of property value uplift appears to peak when the transit project is approved and funded, and then stabilize into a more gradual rate of uplift after completion of the transit project.

Take for example, Figure 14, illustrating the effect on property value as described above. The figure is based on historical observations of the new Ottawa Confederation Line, recently delivered in 2019.[33]

The Confederation Line in Ottawa is a new LRT line that was scheduled for a late 2018 opening date but opened after January 2019. In the long term, real estate prices increased around 39% since the announcement of the LRT project, compared to the city's overall gain of 37% (2008 to 2017)—a premium of 2%. During the short to medium term, there were both gains and losses. Once the project was announced and the public gained confidence that the project would in fact be delivered, there was a spike in prices. But the prolonged construction period dampened confidence, causing annoyances with nuisances like noise and dust, and prices either dropped or stagnated. Research anticipates that by the end of 2021, 2 years after the line opened, values should increase around 10% more than other areas of Ottawa without access to the LRT. [34]

[33] Real Estate Intelligence Network. *Calgary Transportation Effect Report.* 2018. http://cdn3.reincanada.com/workshops/2019_Workshops/March_2019_Calgary_SOS/Calgary_Transportation_Effect_Report_FINAL.pdf
[34] Real Estate Intelligence Network. Calgary Transportation Effect Report. 2018.

Figure 44: Impacts to Property Values across Stages of a Transit Project: a) Pre-Construction, b) Construction, and c) Post-Construction (Based on the Ottawa Confederation Line)



Key Dates that will affect the Timing of Impacts for the Green Line

The following is a summary of key dates for the Green Line LRT project:[35]

- June 2017 – project approved by Calgary City Council
- May 2018 – funding commitment from Federal Government
- 2020, Today – preconstruction, design and planning
- 2022 – construction start
- 2026 – project completion
- 2031 – ridership matures typically after 4 years
- 2038 – end of projection period for potential 0.7% uplift estimates generated in 'Scenario 1' based on historical Calgary Red Line corridor impacts. It is assumed that similar market drivers will be in effect when

[35] Project schedule is per the City of Calgary's 'Green Line Timeline' on the City website.

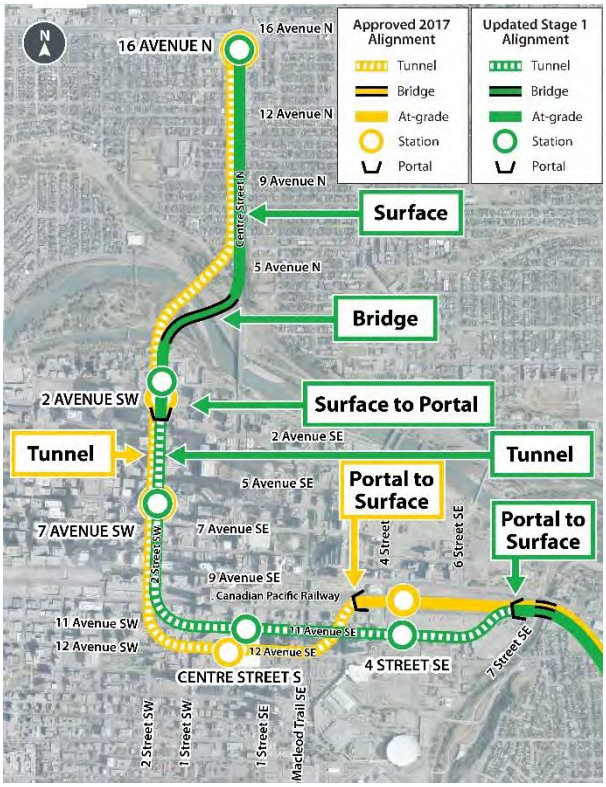
projecting forward for the Green Line. Thus, it is assumed that the uplift would be realized gradually in the long term over an 18-year period like the timeframe for the Red Line corridor impacts.

6.0 Overview of the City Centre Alignment, System Design and Focus Areas

6.1 City Centre Alignment

The alignment is proposed to run surface along Centre Street N, from 16 Avenue N to south of 7 Avenue N, with a terminus station just south of 16 Avenue N. South of 7 Avenue N, the alignment traverses McHugh Bluffs and crosses the Bow River on a dedicated bridge. On the south side of the bridge is proposed a surface station north of 2 Avenue SW, followed by a portal on 2 Street SW, just north of 3 Avenue SW. The alignment continues underground, under 2 Street SW, with an underground 7 Avenue SW station, situated north of 7 Avenue SW, and curves to 11 Avenue S traveling under the CP tracks. The alignment continues underground on 11 Avenue S, with one underground station around Centre St S, and a second one east of Olympic Way SE (4 ST SE station) and along to Ramsay, serving newly developing communities.

Figure 55: Proposed Green Line LRT Alignment



6.2 System Design

The Green Line will need a combination of surface, elevated and below-ground transit solutions for its route alignment through the City Centre. There are concerns regarding how the LRT will impact the quality of its surrounding community, and how this could trickle down into how nearby properties are valued. Some of the concerns relate to decreased accessibility, visibility and attractiveness of buildings and spaces that may be impacted by nearby transit infrastructure (i.e. the elevated bridge over the Bow River and Prince's Island Park; or the portal within a moderate to high traffic street right-of-way to allow the LRT vehicle to go underground.) Different approaches to the design and delivery of the LRT will be required to ensure integration (between transit infrastructure and its community) is optimized and any adverse affects mitigated. The next section on these 'Focus Areas' will look at whether there is likely to be any negative impacts.

6.3 Focus Areas

The following section examines the potential short-, medium- and long-term impacts that could potentially occur as a result of the proposed alignment at specific *Focus Areas* including;

1. the Centre Street N Corridor
2. the bridge over the Bow River and Prince's Island Park; and
3. the station and portal on 2 Avenue SW, within the Eau Claire Market and China Town communities;

These are areas that have been identified as needing careful attention to how the design of the transit infrastructure is physically integrated with its surroundings. The objective is to identity and assess how any potential adverse effects on property value can be mitigated during and after construction.

Centre Street N Corridor

The Centre Street N corridor will be an area with high potential for significant property value gains with the presence of Green Line. It is currently a major arterial road that provides the communities to the north access to the downtown area. It feeds the downtown area with high volumes of daily vehicular traffic. It is also a largely under-developed stretch of very well-located real estate (in terms of proximity and accessibility to Calgary's concentration of high-value jobs downtown).

The Centre Street N corridor has future development potential and the opportunity to transform its placemaking identity. The corridor runs through the Crescent Heights neighbourhood, which is part of a recently completed North Hill Communities Local Areas Growth Plan. In principle, a surface LRT along Centre Street N could spur additional residential and commercial development, provide high visibility to retail storefronts, encourage increased public transit, cycling and walking trips, increase shopping visits and customer spending, enhance the vibrancy of the neighbourhood and provide reliable, quick access to the downtown core. This will be when people can seamlessly get on and off the LRT, safely and delightfully cross through sidewalks and other publics spaces, and into nearby buildings or other destinations. In short, placemaking will be about people's experience of the public realm.

There are obvious, physical constraints in achieving this effect before encroaching on private property. For space-constrained areas, the focus should be on pedestrian safety and ease of navigation. Where the opportunity exists, the public realm can also be maximized through privately-operated public spaces, or POPs, where a private developer could potentially provide publicly accessible open spaces. (For the developer's contribution, land use policies may provide incentives like density bonuses, or other mechanisms.)

Summary of concern(s) and comments:

- LRT construction is likely to cause major disruption to pedestrian flow and vehicle movement—negatively impacting business activity. This will be a short to medium term impact that may be offset by the benefits of consumer spending in the longer term.
- The location of LRT infrastructure, such as its tracks within a major street right-of-way will permanently obstruct vehicle movements and the provision of on-street parking due to the reduction in lanes. This is a long-term impact that can be mitigated through an off-corridor parking strategy including the addition of parking lots and enhancements to pedestrian movement along the corridor.
- The division between the east and west sides of the Crescent Heights community may be exacerbated due to the surface running LRT corridor, which may create a greater barrier. This can be addressed through urban design that integrates the LRT infrastructure with the public realm (i.e. street-embedded tracks, limited to no barriers, well-designed pedestrian crossings, and improved streetscape.); and ensures mobility for all types of modes are well-connected.

CASE STUDY **Mode of Travel and Consumer Spending Survey** **Bloor Street, Toronto**

In 2016, the City of Toronto initiated a pilot project along a 2.4-kilometre stretch of Bloor Street, a busy downtown commercial street and principal east-west throughway. One traffic lane and on-street parking were removed to provide dedicated bicycle lane rights-of-way.

Fast forward three years later, businesses have reported an increase in the number of customers per day. It was found that those arriving on foot or bicycle spend more overall than those arriving by car, through many frequent visits over the course of a year. The percentage of customers arriving by bicycle also tripled.

Source: Economic Impact Study of Bike Lanes in Toronto's Bloor Annex and Korea Town Neighbourhoods, Toronto Centre for Active Transportation, September 2019

Bridge over the Bow River

The proposed bridge will serve as an elevated guideway for the Green Line LRT across the Bow River.

Summary of concern(s) and comments:

- Longer-term impacts to the public realm around the Bow River. Concerns are in terms of visual, noise and vibrational impacts of having the LRT operate nearby private residences and the fear of compromising the tranquility and natural environment of the Prince's Island Park.
- Adverse impacts during construction are less of a concern.
- In the long-term, the Bow River Bridge is not anticipated to have negative impacts on property values.

Figure 66: Modern bridge viaduct provides LRT service through the Hague Netherlands

The Bow River Bridge for Green Line is not expected to adversely impact the waterfront properties. In an earlier (2016) economic analysis by Hatch for Calgary's City Centre[36], it was found that elevated transit infrastructure only depreciated the property value of older building stock. Newly built buildings are generally unaffected since they are constructed to a higher level of building design that mitigates the external impacts of an elevated rail system, like noise. LRT technology has improved, particularly since Calgary built its initial Red and Blue lines, and newer vehicles models can operate much more quietly than older models.

There is an opportunity for the design of the bridge to enhance the urban environment rather than detract from it. In some cases, bridges over water can be iconic or at least complimentary and additive to their urban landscapes. The bridge for the Green Line corridor could be made attractive and become an enhancing asset to the park space in the area. An iconic bridge over the Bow River may warrant a higher degree of specification during the procurement process to achieve a more specific solution where the City takes greater ownership of design. This approach might contrast with a more non-prescriptive, performance based P3 procurement approach used for other elements of the line.

Station and Portal on 2 Avenue SW within Eau Claire and China Town Area

The Green Line scheme will significantly transform the Eau Claire Market and China Town area with a new surface LRT station. There will be a surface station at Eau Claire Market with further plans to improve the public realm around the station area, providing a visually attractive destination for nearby residents and office workers.

Summary of concern(s) and comments:

- Like the Bow River focus area, concerns are on the public realm quality along the promenade here (towards the Prince's Island Park.) LRT construction may be disruptive to the businesses located in this dense commercial area, and tenant attraction and retention for property owners may be a challenge during this short to medium term timeframe.

[36] In a Hatch study of property value impacts due to the Calgary Red Line written prior to this report, a hedonic model was used to understand the correlation between property value gains (or loss) and a property's proximity to a transit station.

- There were also stakeholder concerns around compromised access to parkades. All parkades along 2 Street SW will be impacted by construction, with some disruption to access and perhaps some intermittent closures. However, access will mostly be maintained so potential loss of parking revenue can be mitigated.
- Similar to the concerns for the Centre Street N corridor, a reduction in overall road capacity to accommodate for the LRT infrastructure applies here as well. This is a long-term impact that can be mitigated through good urban design that ensures mobility for all types of modes are well-connected.

Figure 77: (Left) Streetcar Portal along Queens Quay in Toronto; (Right) The multi-modal streetscape and public realm design along Queens Quay

With increased transit capacity in denser urban areas, parking demand generally decreases as users shift from car to other transit modes. Figure 17 shows the Toronto streetcar entering a portal in the centre of the right-of-way, before travelling to an underground station. The characteristics of this neighbourhood resemble that of the proposed portal site in Calgary; the area is densely developed and includes both residential and commercial buildings. The portal has a minimal footprint and associated infrastructure; utilizes newer, quieter light rail cars; and boasts an enhanced urban environment that encourages active travel patterns.

CASE STUDY	**Waterfront LRT Streetcar Portal**	**Queens Quay, Toronto**

The Waterfront LRT portal in Toronto, Canada has not adversely impacted the community in which it is located. The portal likely could have been designed with a better outcome on aesthetics, and one of the dominant buildings in the area does little for the attractiveness of the street. Nevertheless, cycling and pedestrian footfall along the Waterfront has increased since the completion of the grade-separation scheme, leases are held by high quality tenants and property values here have increased significantly in the hot Toronto market despite the proximity to the portal. The Queens Quay West Waterfront LRT portal in Toronto is part of Toronto's central waterfront. It is worth noting that while there has been significant investment and focus in the general waterfront area this immediate area was already largely built-up with older generations of residential and commercial high rise development.

7.0 Findings: Impacts to Property Value and the Tax Base

A major takeaway is that the new Green Line LRT will contribute to long-term incremental uplifts to property values. These impacts though, will not be evenly distributed and will vary depending on property type, land use and proximity to station. Furthermore, the estimated impacts herein should be considered conservative because it does not yet take into consideration further induced growth.

The new Green Line LRT will help create market demand around stations areas where underutilized land will be converted into higher-and-better uses that would not have been supported otherwise with a typical road network.

As such, there will be additional value that is created from new, higher-density development that is mixed-use and designed with the public realm in mind.

7.1 Before Construction

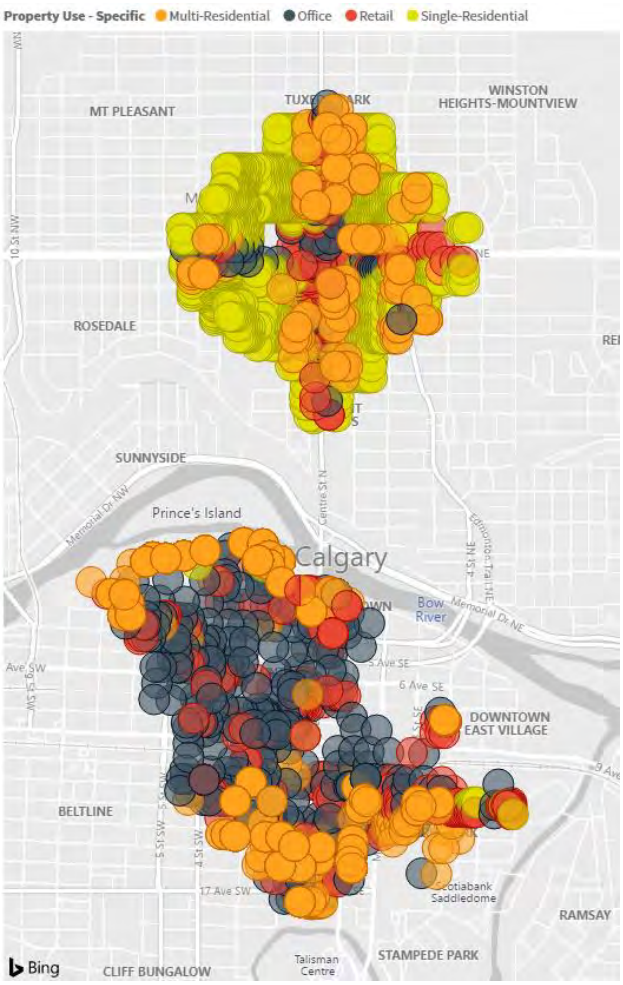
Over 15,000 properties were identified to be within reach[37] of potential impacts due to the Green Line LRT and were assessed for property value uplift potential. See Figure 18.

At baseline, today, the total assessed property value of all residential and commercial properties located within reach of potential impacts from a future surface Green Line station in the City Centre area is over $16.9 billion.[38] This $16.9 billion property tax base, at 2020 values, yields approximately $330 million in annual property tax revenue for the City and the Province (this is both municipal and provincial tax revenue).

Though most of the properties are designated as residential (multi and single)—over 90%, commercial properties make up the lion share of the total value. The total assessed value of all commercial properties is $12.3 billion, or more than 70% of the total $16.9 billion.

Most of the properties are located closest to the 11 Avenue SE & Centre Street S station providing a total assessed value of $2.9 billion. On the other hand, the station area at 6 Avenue SW and 2 Street SW has the lowest number of unique properties but provides a total assessed value of $7.1 billion. See Figures 20 and 21.

Figure 88 – Map of All Properties within the defined impact zone to a future Green Line LRT Station in the City Centre (for after construction impacts)



[37] Within reach is defined as 800-metres driving distance to a surface station, or 450-metres to an underground station. Underground stations have less catchment area than surface stations because of the additional travel distance required by underground stations (i.e. vertical circulation up and down). Although this also assumes that vehicle speeds and travel times are equal. This is because underground stations usually result in faster trip times, which means that the relative attractiveness of the service is greater and so there is a counterbalance to the reduced catchment because of increased access time and distance.

[38] Based on assessed property value provided by the City of Calgary in January 2020.

Figure 9 – Number of Properties that may be impacted by the future Green Line stations in the City Centre area

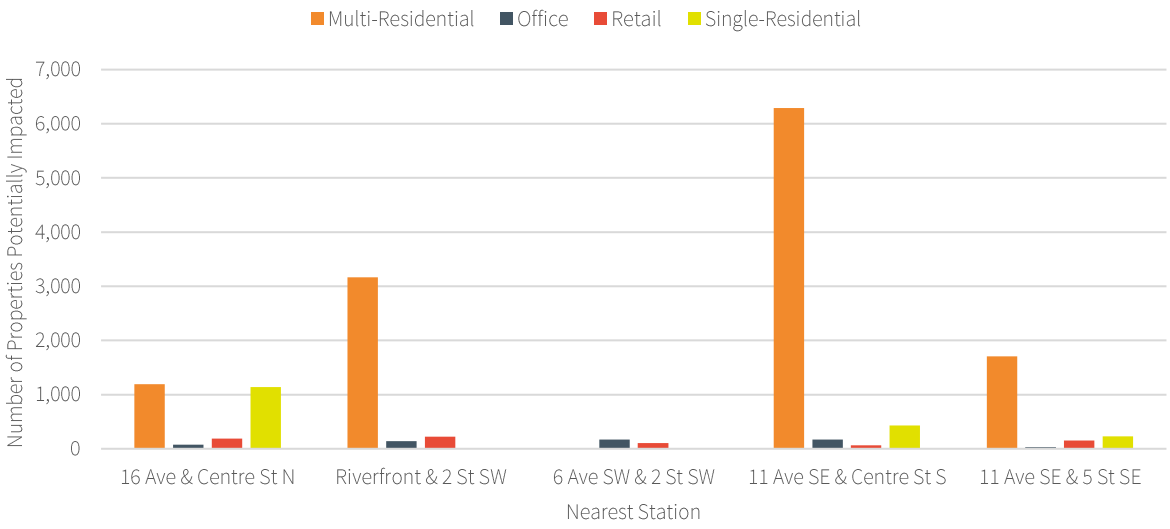
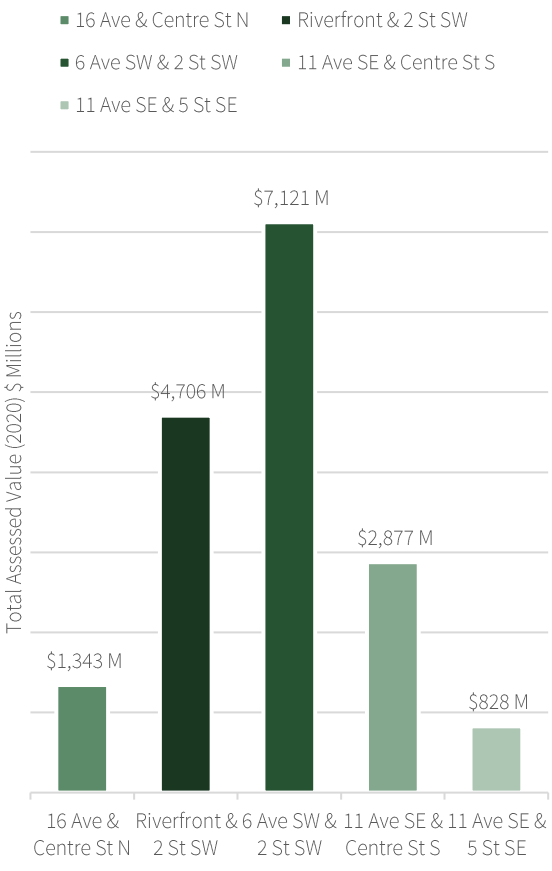
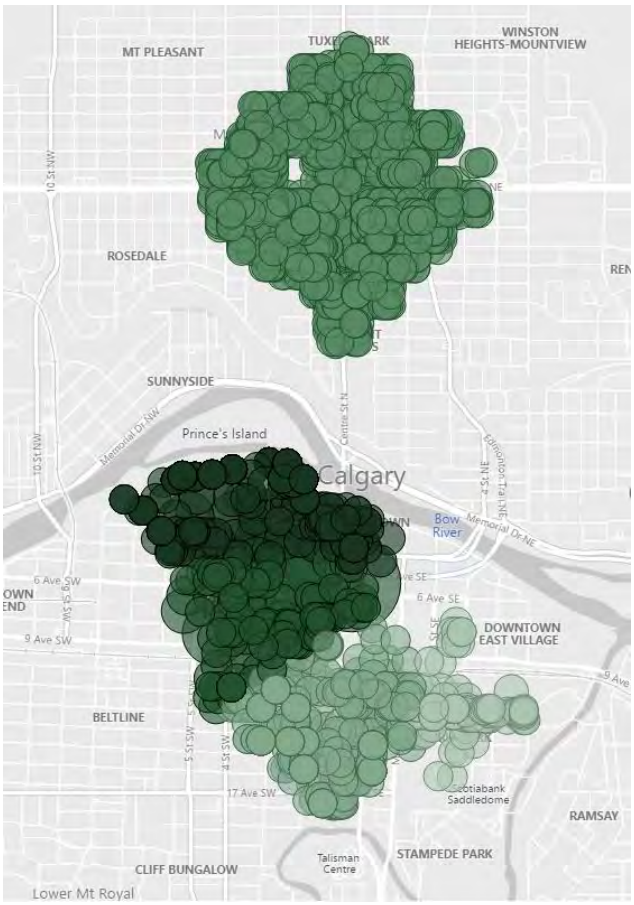


Figure 100 – Total Assessed Property Value Today (Baseline in Year 2020) by the Nearest future Green Line station areas





7.2 During Construction

> *Businesses on corridors slated for transit construction face two headwinds, one temporary and one long-lasting. The first is the effect of construction on revenue through lost access, loss of parking (temporarily for staging or long-term), water and electricity service interruptions, and experiential nuisances like dust and noise. The second is the rise in property values, if the business is renting its space. Rising land values are benefits to owners, but rent increases in expectation of rising land values force businesses to adapt or exit, and not all sectors or business structures are equally able to survive such churn.* [39]

During construction of the new Green Line LRT, there may be impacts in the form of *business loss* attributed to the loss of tenants due to disruptive construction. If the current double-digit vacancy rates[40] for commercial office properties continue, negative impacts will be compounded—for the landowner's assessed property value, and consequently the City's and Province's property tax revenue base. With that said, impacts due to construction are temporary, and could be offset by the longer-term growth in property values.

How Properties are Assessed in Calgary

Property assessment is the service of assessing properties within the corporate limits of the city of Calgary as a mechanism to fairly and equitably allocate property taxes. This directive is provided by the Government of Alberta's Municipal Government Act, its regulations and associated civic bylaws. This legislation largely directs the property assessment activities which, while broad and complex, can be summarized as the preparation, communication and defense of property assessments.

Property assessments are derived using similar techniques to individual appraisals such as the analysis of market data, but are applied on a mass basis to large groups of properties. Large infrastructure projects, economic issues and natural disasters can all affect real estate values. To understand and analyze the impact of those events, assessors would undertake an analysis of sales or rental activity both before and after the event.

For recent LRT extension projects, assessors reviewed sales activity and rental activity which occurred during construction and after construction to determine both if there was an effect on properties adjacent to the project but also if there was an effect on properties in the surrounding area.

For the Green Line, a similar exercise will be conducted where sales and rental activity will be monitored during construction and after the project is complete to discover the impact on real estate values. This impact will then be incorporated into the property assessments which are derived on an annual basis.

Impact on Businesses due to Station Construction

In a 2011 technical report for the US Department of Transportation (USDOT) on 'Potential Impacts on Business Revenues during Construction of the Central Corridor Light Rail Project,' it was estimated that there may be at most an average 2.5% in small business revenue loss due to station construction for the Central Corridor LRT project in

[39] 2017 Journal of Transport & Land Use Vol. 10 No. 1 "Open for business? Effects of LA Metro Rail construction on adjacent businesses"
[40] Currently at 22% overall across all office markets in Calgary by Q4 2019. Peak vacancy was last recorded in Q2 2018 at 24%.

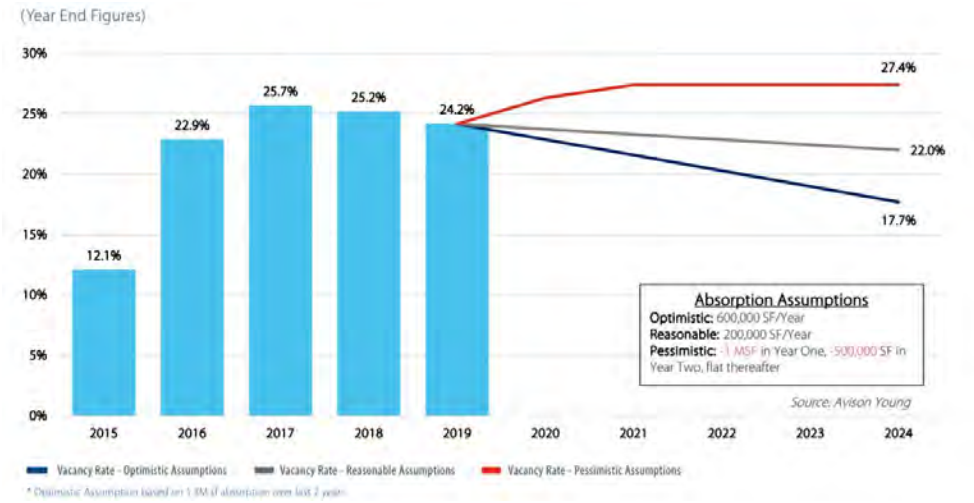
Minneapolis, USA.[41] In another study by the same author for the LA Metro Rail project, it was found that within 400-metres to station cut-and-cover construction areas, business failure rates increased by 46%.[42] However, the author further caveats that while the empirical model shows considerable effects near station construction areas, there is a real possibility that the effect is not from construction, but from inherent location characteristics. The same observation was made for business revenue loss. Though business revenue loss was found to be the greatest within proximity to station construction areas, it was not found to be statistically significant, meaning revenue loss may not be the reason why businesses are failing. Business impacts are highly localized and learning from the case of Calgary's 17 Avenue S.E. BRT project, business impacts are understood to be higher than the 2.5% losses seen in Minneapolis, according to City of Calgary staff.

Potential negative impacts to tenants during station construction could include increased noise, vibration and dust; decreased accessibility, visibility and overall pedestrian-friendliness; which could decrease footfall and consumer spending. This may then translate into increased business or tenant turnover, and thus increased vacancy and compressed net operating income for the property owner.

Station and light rail project construction can generate negative impacts to local businesses, but business sustainability is a result of many factors, many beyond light rail construction. Short term impacts can be managed through business impact mitigation programming, which the City can take a leading role in, and must be considered in light of longer-term benefits that may be likely. Experience from rapid transit projects worldwide, including the case studies here, indicates that business impact mitigation programming should be a part of implementation planning.

Impact on Property Value due to Increased Vacancy

Figure 111 – Downtown Calgary Projected Vacancy (2020-2024) by Avison Young



Calgary is still recovering from a downturn in the oil sector that began in 2014. Between 2015 and 2019, the overall value of downtown office properties fell by more than $14 billion, according to the City of Calgary's assessment

[41] Radin, Sari; Ray, Rosalie. Technical Report on the Potential Impacts on Business Revenues during Construction of the Central Corridor Light Rail Project. US Department of Transportation (USDOT). 2011.
[42] 2017 Journal of Transport & Land Use Vol. 10 No. 1 "Open for business? Effects of LA Metro Rail construction on adjacent businesses"

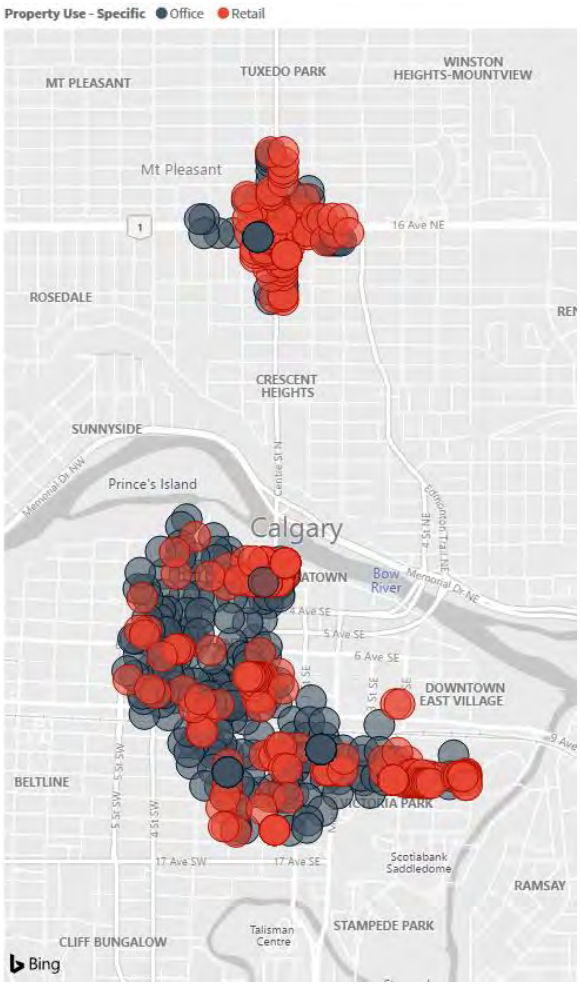
department. In the previous year alone, from 2018 to 2019, office property values fell by -32%, according to the City, (while residential across all types fell by only -1%, retail remained flat, and industrial fell by -4%).[43] Historically, Calgary office net rents have experienced a downward trend at an average annual rate of about -6% over the last 10-years (1999-2019), or -8% over the last 5-years (2014-2019).[44] By the end of 2019, Calgary's office space market was experiencing historically high vacancy at 22%.[45] Office leasing activity in Calgary will remain challenged until economic growth returns to the market.

In a Q4 2019 study by Avison Young, downtown office vacancy rates in Calgary (24% by the end of 2019) are forecasted to decrease to 22% or even down to 18% by 2024 in the study's base and optimistic scenario; or increase to 27% in its pessimistic scenario.[46] See Figure 21. These forecasted vacancy rates range between 2 to 6% more or less than current levels over a 4-year period. A similar range in changes to vacancy levels during construction of the Green Line is assumed for the purposes of estimating at a high level the potential loss to commercial property values. *See Table 7.*

In a 2017 study where the effects of LA Metro Rail construction on adjacent businesses was examined, it was found that businesses were negatively impacted (in terms of revenue loss) if it was located within approximately 400-metres to cut-and-cover station construction, or within 60-metres to tunnel boring construction areas.[47] At this time, it is not yet confirmed as to which construction method will be used for the Green Line. To be conservative for the purpose of estimating for potential impact on property values during station construction, the study assumes cut-and-cover construction methods will be use (so, a 400-metres radius impact zone from each station).

Over 10,000 existing commercial properties (retail and office) are located within a 400-metre distance to a future LRT station and its future construction zone and possibility exists for negative impact. See Figure 22.

Figure 122 – Map of all Commercial Properties (retail and office) within the defined impact zone to station construction areas in the City Centre (for during construction impacts)



Negative impacts to property as a result of construction are dependent on the nature of construction and the local context. If the road network is significantly limited and access constrained, properties not immediately adjacent to the dust and noise of construction may still experience

[43] Giovannetti, J. Globe and Mail. Calgary office-space values plummet 32 per cent in 2018 as home prices hold steady. January 2019.
[44] Avison Young Mid-Year 2013/14 Canada & US Report & Co-Star Mid-Year 2018 Report
[45] Avison Young Q4 2019 Calgary Office Market Report.
[46] Ibid.
[47] 2017 Journal of Transport & Land Use Vol. 10 No. 1 "Open for business? Effects of LA Metro Rail construction on adjacent businesses"

negative impacts. Properties immediately adjacent to active worksites will obviously be impacted. It is possible, in certain locations, that tunneling work underground adjacent to structures may technically have impacts but, customers and tenants will not notice much disturbance and so effects may be limited or even zero.

It is important to remember that if the construction project can be delivered within a predictable timeline and the timeline is manageable, on the other end of the potential negative impacts are the improved access of a significant light rail project and its associated benefits.

Demand in the residential rental market remains strong, due to improving labour market conditions, and would likely not be affected in the same way as the commercial market.[48] (Residential property prices across all types have experienced a more moderate growth at an average annual rate of about 1% over the last 10-years (1999-2019), or -1% over the last 5-years (2014-2019).) As such, while impacts to retail and commercial property are certainly possible and will occur in some locations, it is not believed that Green Line construction would lead to any potential negative impacts to residential properties in the form of increased vacancy and therefore meaningful value.

Stakeholder Concerns During Station Construction

There are stakeholder concerns around potential negative impacts due to station construction, and the strain this will have on already challenged leasing activity for commercial space—particularly in and around the Downtown area. Concerns voiced by stakeholders include increased traffic congestion and unsafe and unattractive pedestrian environments due to transit infrastructure elements like portals and station platforms. Significant mitigation can be achieved during construction with thoughtful phasing, construction, and other programming. Design and project planning expected to occur in subsequent phases of project advancement are where real solutions and the communication of those solutions with concerned stakeholders, can occur. Global experience, including some of the experience of the case studies, shows that there is a wide variety of challenges and design solutions that have been employed to fit light rail into urban environments in a way that minimizes disruption or even enhances public realm. These design solutions can be advanced as part of future design and implementation, including stakeholder engagement, communication plans, and procurement.

A non-prescriptive, performance-based procurement process presents opportunities for innovation in design and efficiencies in delivery by the private sector. This recommendation was echoed by the interview group where references to the Westbrook transit-oriented development (TOD) project along the West LRT line were made. Though the project was recognized as possibly the “only true TOD project” in Calgary to date, the project is an example of an unsuccessful approach of leveraging private sector innovation. When the City first went to market with the Westbrook TOD proposal following its acquisition in 2012, there were many prescriptions placed on the development scheme (i.e. construction timing, use and siting clauses). This became a major deterrent to the market, and before the project could take-off, the Calgary market began to experience its downturn.

In some circumstances, a higher degree of specification is warranted for specific solutions (i.e. an iconic bridge, or a specific neighbourhood intervention). In other cases, fine-tuning the procurement can yield better results. Specific neighbourhood challenges need to be dealt with on a case-by-case basis in the design and procurement development of the Green Line.

7.3 After Construction

Two methods were used to determine impacts. One method (‘Scenario 1’) looked at historical Calgary property values related to Calgary Red Line corridor impacts and generated a low, or conservative outcome for the Green

[48] Rental Market Report for Calgary CMA by CMHC, released in January 2020.

Line: 0.7% property value increase year over year. A second method ('Scenario 2') looked at relevant non-Calgary case studies and resulted in a higher, more optimistic outcome: 2.4% year over year. Both the low and high potential outcomes are relative to what property values would have otherwise been without the Green Line LRT. See Table 1 for an overview of the selected case studies for comparison.

The conservative potential uplift of 0.7%. would correspond to the property tax base growing as a result of the LRT being constructed; growing from $16.9 billion to $18.9 billion in 2038, and corresponding *additional* annual tax revenues of $43 million in 2038.[49] The high potential uplift of 2.4% would correspond to the property tax base growing from $16.9 billion to $24.3 billion in 2038, and corresponding *additional* annual tax revenues of $420 million. The low and the high uplift estimates set out a reasonable range of outcomes for property value impacts to be expected from implementation of the Green Line LRT.

To estimate potential impacts, this study assumes uplifts from Green Line would start occurring in 2020. The timing of uplifts is sensitive to solid perception from the market the benefits of the Green Line project will in fact occur; in other words, uplifts will occur on the basis that the project is widely believed to be well on its way to completion. Due to uncertainties related to funding and other government decisions related to the Green Line, it is likely that the uplift may be delayed, and may not be realized by the market until significant, visible progress (i.e. major contracts let, corridor construction) is realized. While this may mean uplift would realistically be in years subsequent to 2020, the estimates made in this study would still be relevant with relatively little deviation.

We found that historically in Calgary (due to the Red Line LRT), property value was strongly *influenced* by how close the property was to a transit station compared to all the other characteristics. Generally, the closer a property was to a transit station, the bigger the change in value. In addition, in *how* property value is influenced (whether positively or negatively) also strongly depended on the use of the land, like residential, retail or office. For example, all properties irrespective of its land use saw its value *change* the most within the immediate 20-metres of a station. However, while multi-family residential, retail and office properties saw an *increase* in value over time; single-family residences saw a *decrease* in value. These trends were then applied to properties proximate to the new Green Line LRT to see how those property values may be impacted.

[49] Per the current 2020 property tax rates for the City of Calgary and the Province of Alberta.

Figure 133 – Summary of Potential Property Value Impacts, After Construction of the Green Line: Potential impact on property values within proximity to future Green Line LRT station in the City Centre area

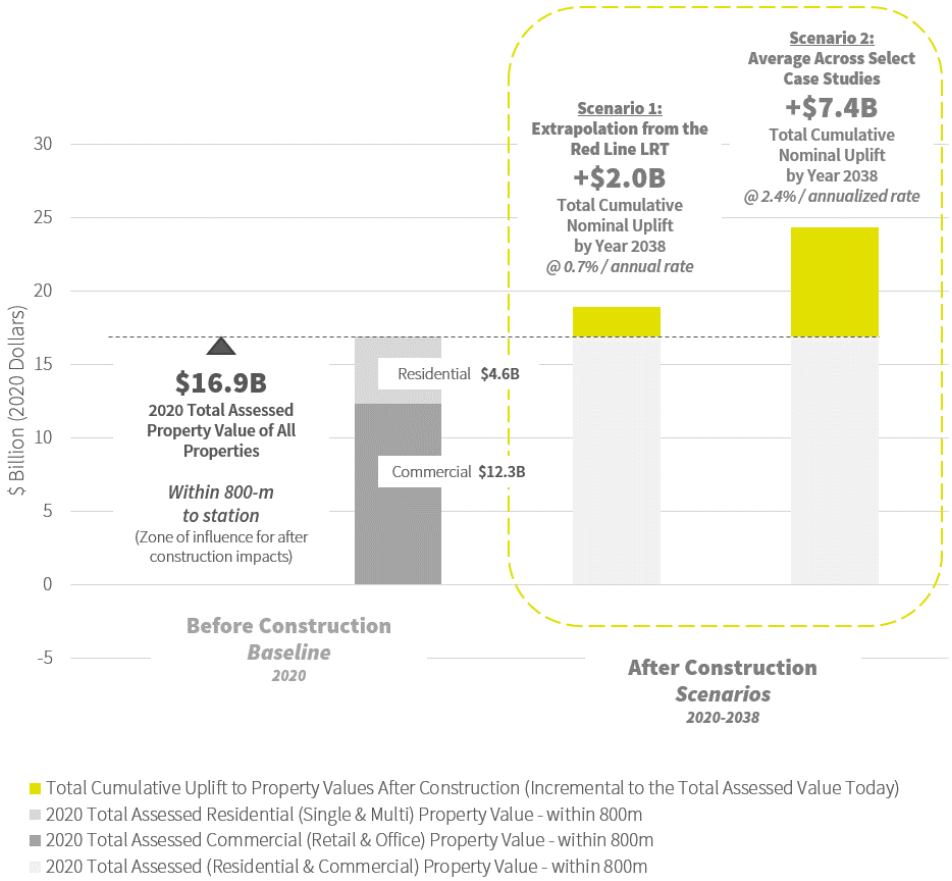


Table 8: Summary of Uplift Potential for 'Scenario 1' – Extrapolation of Red Line Corridor Impacts

	Before Construction Baseline conditions in 2020			**After Construction** Projection up to 2038 (an 18-year period)	
Nearest Station	*Count of Properties** 2020 Rounded 00's	*Total Assessed Property Value* 2020 $ million	*Total Property Tax Revenue* 2020 $ million	*Potential Value Uplift* 2038 $ million	*Additional Tax Revenue* 2038 $ million
16 Ave & Centre St N	2,600	$1,343	$26	$35	$1.21
Riverfront & 2 St SW	3,500	$4,706	$91	$627	$15.10
6 Ave SW & 2 St SW	300	$7,121	$138	$902	$18.80
11 Ave SE & Centre St S	7,000	$2,877	$56	$203	$6.47
11 Ave SE & 5 St SE	2,100	$828	$16	$56	$1.67
Overall	**15,500**	(a) **$16,875**	**$327**	(b) **$1,824**	**$43.20**
			Total Cumulative Uplift % (b) ÷ (a) = (c)	**12%**	
			Annualized Rate of Uplift % (c) ÷ 18-years	**0.7%**	

The empirical analysis for the Red Line case study informed the extrapolated 0.7% in potential value uplifts year over year for the Green Line. It helped confirm that Calgary Red Line corridor impacts on property values were strongly influenced by how close the property was to a station compared to other characteristics including built density,

building age and even neighbourhood. This is generally consistent with the findings in other literature and the case studies.

It was found that Calgary Red Line corridor impacts contributed to long-term, cumulative property value uplifts ranging up to 93% more than the median value, depending on the property's proximity to the station and its land use. At the same time, there were also negative impacts ranging down to -47%.

While the data set presents a range of potential impacts specific to Calgary, property value uplifts appear to peak within a 500-metre distance to an LRT station. Beyond that distance, some land uses (i.e. office and multi-residential) maintain value uplift potential better than others. Other land uses (i.e. retail) are more sensitive to station proximity than others and may see their values underperform relative to the median value for their market if not located within a certain distance (for the Calgary Red Line this appears to be within 100-metres) relative to transit access.

A final note on the potential 0.7% uplift is that it is an *upper bound estimate* of Scenario 1 (generated using historical Calgary property values related to Calgary Red Line corridor impacts). There is also a *lower bound estimate* of a 0.2% uplift year over year under the same method, when the potential uplift percentages for retail and office properties are taken as a blended average as one broad commercial category and the retail. (This would align with how property tax base is assessed in Calgary as either residential or non-residential categories.) In doing so, the uplift potential for office properties is dampened by the uplift potential for retail properties, which was found to be much more negatively impacting due to retail's uplift potential being highly dependent on its proximity to a transit station.

For example, within 800-metres to a station, retail properties may experience uplifts ranging from -47% to 93%, with impacts becoming negative once the lot is beyond 100-metres to a station. On the other hand, office properties were found to experience positive uplifts generally throughout the 800-metres distance to a station, with less potential for negative impacts at an overall uplift range from -2% to 69%.

The 0.7% uplift estimate is likely a better reflection of how property values would be impacted as it would account for the nuanced variations to potential uplifts for office and retail properties respectively.

Given the above, a 0.7% uplift estimate should still be considered low and conservative. It can be reasonably assumed to be realized gradually in the long term over an 18-year period like the timeframe for the Red Line corridor impacts. Notably, the potential 0.7% uplift does not yet consider the anticipated role of city-shaping around the Green Line stations for the next generation of growth. When this happens, additional value will be created from new development on top of the base uplift in value of properties in its current condition. Additional value will be created from either the rezoning and/or intensification of the property into higher value and higher density development.

Likely Distribution of Uplift Potential and Induced Development by Station Areas

Anticipated in the near to medium term following the completion of the LRT, properties (in their current use) around the future stations at Riverfront & 2 Street SW and 6 Avenue SW & 2 Street SW are estimated to gain the greatest amount of uplift. This is because there is already a large base of high-value commercial properties in those areas today. (For reference, the combined assessed property value of these two station areas today is $11.8 billion.) Worth noting, uplift potential for commercial properties may be dampened given the current oversupply of office space and whether there may be enough demand in the future to absorb current vacancies and attract new investments.

Figure 144 – Property Value Impacts by Nearest Station for After Construction Scenario 1 (of 0.7% annualized rate of uplift)

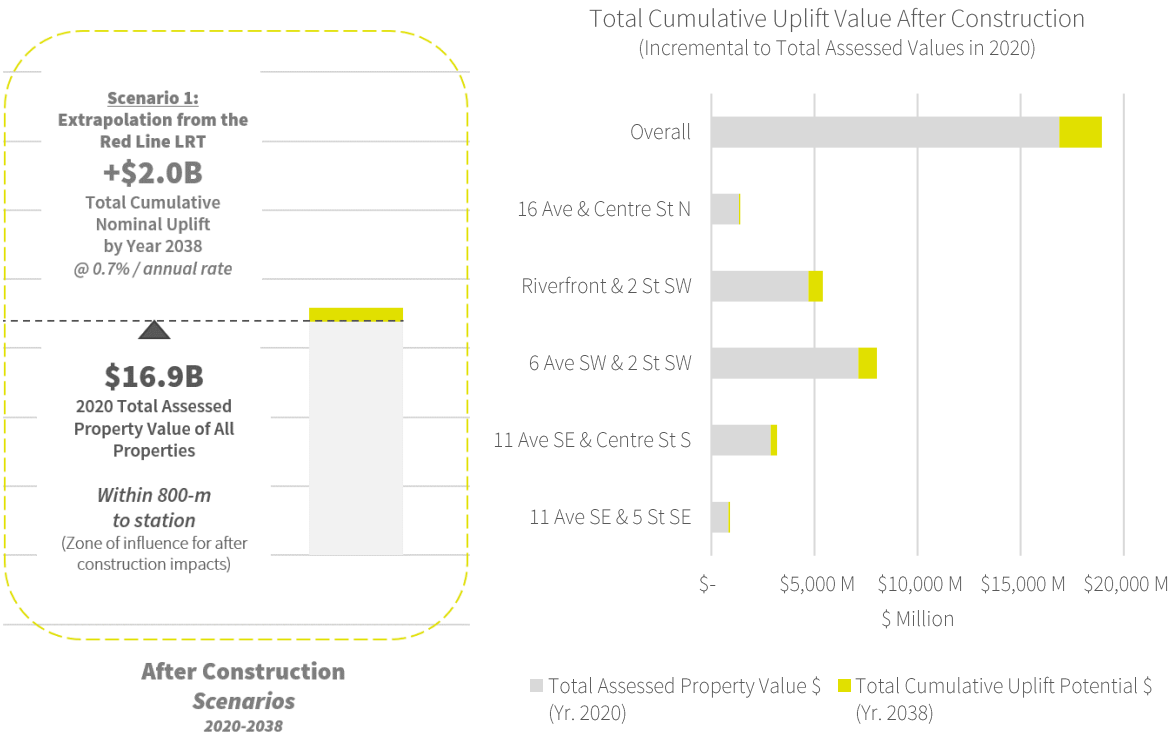
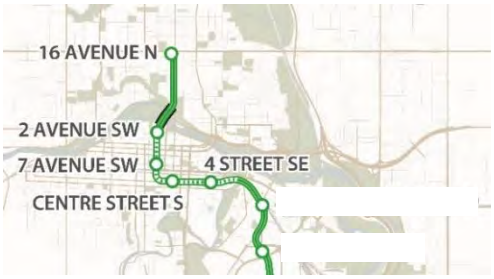


Figure 25 – Key Map of the 5 Future Green Line Stations in the City Centre Area



In the longer term, properties that undergo intensification and/or change into higher-value uses will create the greatest amount of new value. This is in addition to the uplift in base value of the property at its current density and use today. The properties that are most likely to be redeveloped in this way will be properties that have little to no convenient rapid transit access prior to the Green Line; are of low built density and/or a lower value use than what the market would demand of it afterwards (e.g. parking properties). This redevelopment is likely, if supported by municipal plans and policies. Properties around the future stations at 11 Avenue SE & 5 Street SE, Riverfront & 2 Street SW, and 16 Avenue & Centre Street N fit this profile for additional development growth. These are the Beltline, Eau Claire/Chinatown, and Centre Street North corridor respectively.

The high-growth potential in the Beltline Area is further supported by concurrent land use and urban development planning initiatives, such as the anticipated new event centre and other high-density development plans, which is aligned with the strategy of supplying attractive amenities and destinations for the nascent downtown fringe.

Table 9: Overview of Existing Property Characteristics and Capacity for Future Development Growth

Nearest Station	*Area*	*Predominant Land Use*	*Transit Access*	*Land Value*	*Development Potential* [1]
16 Ave & Centre St N	Crescent Heights	Residential / Commercial	BRT	Low	Medium / High
Riverfront & 2 St SW	Eau Claire / Chinatown	Mixed-Use	BRT	High	High
6 Ave SW & 2 St SW	Downtown	Mixed-Use	BRT, LRT	High	Low / Difficult
11 Ave SE & Centre St S	Beltline	Residential	BRT, LRT	Medium	Medium
11 Ave SE & 5 St SE	Beltline	Commercial	BRT, LRT	Low	Medium / High

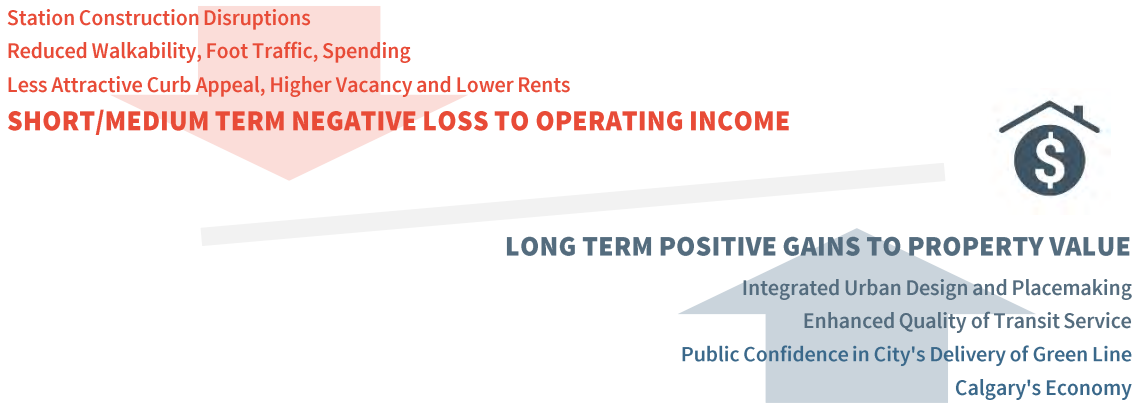
Notes:

1. The value *created* from this development potential is in addition to the potential *uplift* in value the property at its current density and land use.

The Green Line LRT will help the City of Calgary position itself well for future growth in the next generation and during its next market 'boom'. Today, even in a slowed economy, its transit network is highly utilized and is evidence of the need for more capacity in the next growth phase of Calgary. With the implementation of the Green Line LRT, Calgary's downtown core will be strengthened and help retain a productive and vibrant concentration of high-value jobs and talent. (A level of concentration that has been declining faster than any other top-ten Canadian city region by population over 1996-2016.) The Green Line LRT will be able to support the necessary residential and mix of uses in the Eau Claire Market and Beltline area, in particular.

Overall, the Green Line LRT project will be a positive long-term, city-building investment for Calgary. In the long run, the City, Province and property owners are expected to benefit from property value increases that would be more than what they otherwise would have been without the Green Line. Inherent with any transit infrastructure project, there may be "winners and losers". Within this reality, the report considers a range of scenarios to understand the balance of potential negative and positive impacts.

Figure 156 – Balancing the potential negative and positive impacts to property value between short/medium and long-term goals



7.4 Comparison with Case Studies

How does the Green Line compare with other major North American metros, and their experience with transit-related impacts to property values? In the following section, the Green Line project is compared against four other comparable light rail transit projects with similar urban conditions across Canada and US, including:

- Calgary's Red Line LRT;
- Vancouver's Canada Line Skytrain;
- Ottawa's Confederation Line LRT; and
- Portland's Streetcar.

Across these select cases, property values experienced a premium to their annual growth rate from 1% to 3.5%, due to the properties' proximity to transit. This is in comparison to the range of 0.2% to 0.7% estimated for the Green Line above (in Scenarios 1 and 2). There are two possible reasons to why the premiums are observed to be much higher than the estimates made here in this study for the Green Line. First, some of the case studies consider a smaller impact area, which generally sees higher uplifts due to the properties being much closer to a station. Second, the case studies take into account changes into higher-value land uses and consequently additional value that is created through new development. See Table 10.

Table 70 – Comparison of other light rail case studies, their reported property value impacts, the timeframe of which those impacts are reported, and the spatial extent of the impacts

Case Study	*Comparability & Relevance to Green Line*	*Timeframe of Reported Property Value Uplifts*	*Impact Area (Distance to Station)*	*Avg. Annualized Rate of Uplift*
Green Line LRT (Calgary, Canada)	Same urban market; serves suburbs to downtown Calgary like Green Line; some differences in urban form served.	1998-2016 (extrapolated for 2020-2038) Property value uplifts are anticipated to be realized in the long term and may be similarly captured over an 18-year period like the Red Line corridor impacts from 1998-2016.	800m	0.7% 'Scenario 1'
Average of Select Case Studies[50]: See Appendix D – Case Studies for more information.	Case studies selected with relatively good relevance to Calgary	Varies All timeframes were more than 10 years	Varies	2.4% 'Scenario 2'
1) Red Line LRT (Calgary, Canada)	Similar economic environment, neighbourhoods and city-shaping forces	1998-2016 An 18-year period of improvements and extensions to a mature transit line that is already in service. *Key dates:* 1976: project approved 1981: first opening date 2001 to 2014: improvements and extensions 2016: end of study period for hedonic analysis	800m	1.0% See Table 2 for summary of aggregate uplift ranges.
2) Confederation Line LRT (Ottawa, Canada)	Involves both surface and underground stations, requiring a portal tunnel in street right-of-way	2008-2021 An 11-year period since the project is announced, through construction and including projections for after construction. *Key dates:* 2012: project approved 2013: construction start 2019: opening date 2021: end of forecast	800-m	2.0%
3) Canada Line SkyTrain (Vancouver, Canada)	Involves an elevated transit guideway over rivers and other public spaces	30 years projection Involving a mature transit line that is already in service and undergoing extensions. *Key dates:* 2009: first opened	300-m	3.3%
4) Downtown Streetcar (Portland, US)	Strong support from City Planning to enable transit-oriented development (TOD) policies and enable further growth	1997-2008 An 11-year period from since the project is approved, through construction and after construction of the transit system, and including subsequent improvements and extensions to its network. Takes into account any additional value created from induced development. *Key dates:* 1990: planning 2001: opening date 2005 to 2007: improvements and extensions	300-m	3.5%

Since the parameters of assessment vary across each case study, an attempt was made to compare against a common indicator. The indicator chosen is an *annualized* rate of uplift to adjust for the various timeframes of reported uplifts. As well, uplifts were focused on totals for the overall property types of residential (all types) and commercial only. Across these select case studies, residential and commercial properties experienced property value increase at an average, annualized uplift rate of 2.4%. A parameter that differs across the case studies is the reported *physical area of impact around the transit station*, which varies from 300 to 800-metres. See Table 11.

Table 81: Overview Comparison of Property Value and Tax Impacts across Scenarios

After Construction		Without	With Green Line		
Scenario	*Annualized Rate*	*2020 Total Assessed Value*	*Nominal Uplift Value*	*2038 Total Assessed Value*	*Additional Total Tax Revenue in 2028*
	(b) ÷ 18 yrs.	(a)	(c) = (a) x (b)	(a) + (c)	(a) + (c)
	%	$ billion	$ billion	$ billion	$ billion
Baseline: Before Construction Based on 2020 assessed property values of residential and commercial land properties within 800-m to a future Green Line surface station; or within 650-m to an underground station.	0.1%	$16.9	$-	$16.9	$-
Scenario 1: Extrapolation based on trends from the Red Line	0.7%	$16.9	$2.0	$18.9	$0.043
Scenario 2: Average of select case studies—captures new value created from induced development	2.4%	$16.9	$7.4	$24.3	$0.144

8.0 Conclusion

LRTs support improved mobility and contributes to city-building in the long-run. How property value will be impacted will vary greatly by other external factors, such as a City's overall economic condition, its planning efforts, and the specific area's level of access to transit before the new LRT project. To ensure property values swing in a positive direction, transit investments need to be thoughtfully coordinated with its surrounding built environment of public spaces, amenities and other nearby buildings. It is expected that the Green Line LRT will contribute to long-term incremental growth in property value.

[50] Additional case studies are provided; however Calgary Red Line, Ottawa Confederation Line, Vancouver Canada Line, and Portland Streetcar were identified as relevant for the purposes of identifying uplift. Additional case studies are Buffalo NY, New Jersey and Toronto Streetcar. See *Appendix D – Case Studies* for more information.

Key Takeaways Going Forward:

1. **The Green Line LRT will provide improved rapid transit access and travel capacity into downtown Calgary where high-value employment is located.**

2. **LRT can if planned, designed, and implemented well, contribute to inducing development and desirable community amenities. Development can be expected to occur in areas where the new LRT provides a sufficiently attractive change in access to people, property and businesses.**

3. **Achieving quality of design and integration of transit infrastructure with the public realm and adjacent development is necessary to maximize gains in property values.**

Recap of Findings at a Glance:

Two methods were used to determine impacts. One method ('Scenario 1') looked at historical Calgary property values related to Calgary Red Line corridor impacts and generated a low, or conservative outcome for the Green Line: 0.7% property value increase year over year. A second method ('Scenario 2') looked at relevant non-Calgary case studies and resulted in a higher, more optimistic outcome: 2.4% year over year. Both the low and high potential outcomes are relative to what property values would have otherwise been without the Green Line LRT.

At baseline, today, the total assessed property value of all residential and commercial properties located within an 800-metre radius (or about a 10-minutes walking distance) to a future Green Line station in the City Centre area is over $16.9 billion.[51] This $16.9 billion property tax base, at 2020 values, yields approximately $330 million in annual property tax revenue for the City and the Province (this is both municipal and provincial tax revenue). Commercial properties make up the lion share of the total value. The total assessed value of all commercial properties is $12.3 billion, or more than 70% of the total $16.9 billion.

The conservative potential uplift of 0.7%. would correspond to the property tax base growing as a result of the LRT being constructed; growing from $16.9 billion to $18.9 billion in 2038, and corresponding *additional* annual tax revenues of $43 million in 2038.[52] The high potential uplift of 2.4% would correspond to the property tax base growing from $16.9 billion to $24.3 billion in 2038, and corresponding *additional* annual tax revenues of $144 million. The low and the high uplift estimates set out a reasonable range of outcomes for property value impacts to be expected from implementation of the Green Line LRT.

This study assumes uplifts from Green Line would start occurring in 2020. Due to uncertainties related to funding and other government decisions, it is possible and likely that the market may not recognize that the Green Line is to be a likely reality until after 2020. It is likely that the uplift will not be realized by the market until significant, visible progress (i.e. corridor construction) has been realized. This would not meaningfully change any of the findings or conclusions presented in this report.

Short term construction impacts could affect both property owners and businesses. Furthermore, commercial properties are likely to be impacted the most. Disruptions from construction could result in business loss to the

[51] Based on assessed property value provided by the City of Calgary in January 2020.
[52] Per the current 2020 property tax rates for the City of Calgary and the Province of Alberta.

area and increased commercial vacancies in already challenged real estate markets.[53] Studies have shown that construction impacts can be felt by properties and businesses within 400-metres to station construction areas.[54] Practically, the properties not immediately adjacent to construction will not be affected significantly unless access is constrained due to impacts to the local transportation network. Properties immediately adjacent to construction areas can be affected and as mentioned elsewhere in the report there are mitigation strategies that can be employed.

The potential 0.7% uplift generated from 'Scenario 1' (an extrapolation of historical Red Line corridor impacts) does not yet consider the anticipated role of city-shaping around the Green Line stations for the next generation of growth. When this happens, additional value will be created from new development on top of the base uplift in value of properties in its current condition. Additional value will be created from either the rezoning and/or intensification of the property into higher value and higher density development. The potential 2.4% uplift generated from 'Scenario 2' (an average across the select case studies) could be a better reflection of how property values may be uplifted in combination with other city-shaping forces including induced development growth seen in other cities.

Green Line: A Long-Term Investment alongside other City-Shaping Initiatives and Private Investment

In the longer term, properties that undergo intensification and/or change into higher-value uses will create the greatest amount of new value. This is in addition to the uplift in base value of the property at its current density and use today. The properties that are most likely to be redeveloped in this way will be properties that have little to no convenient rapid transit access prior to the Green Line; are of low built density and/or a lower value use than what the market would demand of it afterwards (e.g. parking properties). This redevelopment is likely if supported by municipal plans and policies. Properties around the future stations at 11 Avenue SE & 5 Street SE, Riverfront & 2 Street SW and 16 Avenue & Centre Street N fit this profile for additional development growth. These are the Beltline, Eau Claire/Chinatown, and Centre Street North corridor respectively.

Development viability for properties can be supported by concurrent land use and urban development planning initiatives, such as the anticipated new event centre and other development plans in the Beltline Area. Placemaking and urban design will help maximize future potential growth to property values by ensuring the new LRT is highly accessible to and from other amenities and last-mile destinations in the vicinity. Such efforts support the area's attractiveness and demand for space, helping to internalize the new transit benefits into premiums on price and rents.

A non-prescriptive, performance-based procurement process presents opportunities for innovation in design and efficiencies in delivery by the private sector. This recommendation was echoed by the interview group where references to the Westbrook transit-oriented development (TOD) project along the West LRT line were made. Though the project was recognized as possibly the "only true TOD project" in Calgary to date, the project is an example of an unsuccessful approach of leveraging private sector innovation. When the City first went to market with the Westbrook TOD proposal following its acquisition in 2012, there were many prescriptions placed on the development scheme (i.e. construction timing, use and siting clauses). This became a major deterrent to the market, and before the project could take-off, the Calgary market began to experience its downturn. In some

[53] Currently a 22% vacancy rate across all office markets in Calgary by Q4 2019 (Avison Young). Retail vacancy is about 6% as of 2019 (Colliers Calgary Retail Report Winter 2018/2019). According to CMHC in its 2020 Rental Market Report for Calgary CMA, demand in the residential rental market remains strong, due to improving labour market conditions, and would likely not be affected in the same way as the commercial market. Anecdotally, interviewees for this study noted that construction disruptions would decrease the desirability for prospective tenants to sign or renew a lease, and that the probability of a lease renewal would decrease from about 75% to 50%. See Appendix C, Section vi.
[54] This 2017 Journal of Transport & Land Use Vol. 10 No. 1 "Open for business? Effects of LA Metro Rail construction on adjacent businesses"

circumstances, a higher degree of specification is warranted for specific solutions (i.e. an iconic bridge across the Bow River, or a specific neighbourhood intervention).

Recap of Context Discussion: Early 2020 Global Events

Globally, more recent events of COVID-19 combined with oil production decisions in Saudi Arabia and Russia have combined to drive oil prices to historic lows, creating economic headwinds. City-shaping infrastructure projects like the Green Line LRT cannot be planned in response to events unfolding in weeks and months. Light rail projects serving cities are the type of intervention that spans decades.

Calgary's long-term planning indicates substantial population growth, from a metro region of just over 1 million people to metro region of over 2 million. The Green Line is part of supporting that substantial population and associated economic growth that will be necessary.

Ideally large infrastructure projects are constructed when disruption can be lower and there is some excess capacity in the local economy. It is usually very hard to time large projects given the time required to plan, execute procurement, and construct.

In the long run, the City, Province and property owners are expected to benefit from property value increases that would be more than what they otherwise would have been without the Green Line. Inherent with any transit infrastructure project, there may be "winners and losers". Within this reality, the report considers a range of scenarios to understand the balance of potential negative and positive impacts. It will be the combination of transit and city-shaping drivers, and the underlying health of the economy that will together determine the City of Calgary's outlook for property value uplifts due to the new Green Line LRT project.

9.0 About Hatch

Our organization is passionately committed to the pursuit of a better world through positive change.

Hatch embraces your visions as our own and partners with clients and others to develop better ideas that are smarter, more efficient, and innovative. Hatch is a global network of 9,000 professionals working on the world's toughest challenges. Hatch experience spans over 150 countries around the world in the metals, energy, infrastructure, digital, and investments market sectors.

Hatch is employee-owned and independent—free to bring best thinking to problems and opportunities. Hatch is proud of its exceptional, diverse teams combining vast engineering and business knowledge, working in partnership with clients to develop market strategies, manage and optimize production, develop new game-changing technologies, and design and deliver complex capital projects.

Hatch works closely with the communities where Hatch works to ensure that our solutions optimize environmental protection, economic prosperity, social justice, and cultural vibrancy. Hatch wants businesses, ecosystems, and communities to thrive, both now and into the future.

Hatch people are passionate about our corporate purpose and values. Hatch people believe in long-term relationships with partners and are committed to clients' lasting success.

Hatch people are "entrepreneurs with a technical soul."

About the Urban Solutions Practice at Hatch

Hatch has developed an Urban Solutions group built to support cities and the private sectors as they face pressing problems resulting from densification, extreme events, growing social inequity, disruptive technologies, limited finance and leadership, and increasing competition for talent and investment. Hatch Urban Solutions are a global network of city-building experts, with a mission to inspire positive change in global cities with robust quantitative evidence, deep technical expertise, and ambitious strategic vision.

Hatch Urban Solutions helps public and private sector clients tackle the challenges of urban change and respond to some big questions around urban growth:

- How can infrastructure generate diverse and inclusive growth?
- How can a cities' markets, often property markets, be impacted by major change?
- How can a city be made to be competitive for investment?
- How can quality of life be improved for growing urban populations?

With collective deep technical capabilities in financial, economic, and urban planning; strategic visioning and spatial planning; and rigorous quantitative analysis, Hatch Urban Solutions provide integrated solutions for clients, from concept to completion.

About the Authors of this Report

Leadership Team

Michael Sutherland, Project Direction

Michael Sutherland is a Director at Hatch responsible for the Urban Solutions practice in Canada and as a member of the Hatch Urban Solutions global leadership team also contributes to projects in South Africa and USA. Michael works with public and private sector clients particularly at the front end where infrastructure strategy, planning, economics, and early delivery thinking come together.

Michael has worked at Metrolinx and the Province of Ontario Ministry of Infrastructure. At Metrolinx Michael led the development of the business case and approvals process now used across Metrolinx; he led the planning and early funding approvals for the enormous GO Expansion program now underway, and he launched Metrolinx's Transit-Oriented Development program by negotiating the CIBC Square project next to Union Station. He had a hand in most large capital transit projects at Metrolinx now underway.

Michael is a recognized expert in cities, transportation, infrastructure finance and economics, government, and making large projects happen. He also has an engineering degree from Queen's, a Master's from the London School of Economics and a law degree from the University of Toronto.

Patrick Gulliver, Senior Advisor – Transit Economic Impact Assessment

Patrick Gulliver is a highly experienced economist and practice leader with 30 years of track record in city and regional economic strategy, economic analysis of transport and infrastructure investment, and regeneration. Patrick has developed a range of specialisms including: economic masterplanning and strategy, planning for economic growth around new rail investment, transit oriented development, labour market & skills strategy, strategic corridors, regional and sub-regional growth strategy, sector studies, business and enterprise support, innovation and the knowledge economy.

Patrick is known for the Economics of Place, having led the UK's first economic masterplan for Sheffield, and has recently completed an international economic strategy for the city of Cardiff, an economic masterplan for Limerick in Ireland, a Regional Growth Strategy for the East Midlands around HS2 and a growth study relating to new services and station improvements at Newcastle Central Station (with WSP), a growth strategy for Sheffield City Region around new HS2 investment, and economic forecasts for the Northern Gateway Development Zone predicated on new HS2 services at Crewe. Much of his work involves assessing the economic potential of areas and devising economic and physical strategies to unlock growth. Often Patrick's work is about developing new distinctive city districts for business, learning, culture, the evening economy and retail. Patrick also led on the London 2012 Olympic Employment Impact Assessment.

Patrick has a strong and current international track record in developing economic growth and diversification strategies. This work includes projects in New York, Philadelphia, Suez, Northern Iraq, Kazakhstan, Moscow, Jeddah, Riyadh, Abu Dhabi, Qatar, and several cities across southern China.

Jayne Patterson, Senior Advisor – Property Impact Assessment

Jayne Patterson is a Professional Appraiser with extensive experience in the review and approval of appraisals for complex valuation assignments of full and partial property acquisition for amicable acquisition and Expropriation. She possesses comprehensive knowledge of land valuation theory, highest and best use analysis and economic impacts to property resulting from infrastructure improvement projects, and expertise in appraisal methodology

and industry best practices for valuations specific to corridor acquisition scenarios including specialty use value, injurious affection and business loss.

Jayne has a very solid understanding of expropriation law specific to due diligence of expropriating authorities and compensation requirements under the Expropriations Act including: easements, partial acquisitions, temporary interests, leases and permissions to enter. She is also experienced in the valuation of various land uses such as commercial, industrial, publicly owned, residential, condominium, retail, farm, conservation, historically designated, hazard lands, development lands, assemblages, specialty use and over improved property. Jayne managed the appraisal approval process for property acquisition on VivaNext Bus Rapid Transit and Hwys 7 & 407 ETR infrastructure projects. Recent experience includes the management of negotiations of access agreements for publicly owned land on the VivaNext project.

Jayne developed and implemented a quality assurance monitoring process for Bank of Montreal, and managed the appraisal review team. As the Senior Manager of Collateral for TD Bank, she responsible for all collateral assessment procedures and adherence to regulations set by the Office of the Superintendent of Financial Institutions. She also served on the Standards sub-committee for the Appraisal Institute of Canada.

Support Team

Betty Vuong, Project Manager / Senior Consultant

Betty Vuong is a project manager and senior consultant at Hatch helping municipalities, transit agencies and private developers realize projects involving infrastructure. Betty spends a lot of time focusing on TOD. Betty helps clients navigate the technical and regulatory challenges; strategize financial and investment partnerships; adopt emerging technologies; and assess triple-bottom-line impacts for people, businesses and environment. As part of the Toronto Union Station revitalization project, Canada's largest civic-infrastructure project, Betty has helped conceptualize and design the entire station's privately-leased commercial-retail areas to accommodate over 100 tenants and 130 million annual passengers by 2021 (a project value of over $37 Million). Betty has an architecture degree from Ryerson University, and a Master's from Harvard University for real estate and the built environment.

Jamie Kennedy, Consultant

Jamie is a Consultant with Hatch Urban Solutions and has been involved in a wide variety of development and land-use planning projects in Canada and the UK. Jamie's work has included masterplanning and transport strategy for major redevelopment of a national heritage and transit-oriented area in Bristol, England. He has been actively involved in cost benefit analysis and optimization of real estate development adjacent to, and integrated with, transit stations and railways. Jamie works with local and regional transit agencies to facilitate realization of maximized development potential, improved integration with transit facilities and enhanced public realm.

Laura Berazadi, Senior Consultant

Laura Berazadi is a senior consultant with Hatch's Urban Solutions practice and works with public and private sector clients to optimize and develop assets – with a focus on transit, infrastructure and building complete communities. With more than 15 years' experience in urban design, Laura has concentrated her practice on placemaking, social enterprise and innovation. Laura is currently advising real estate developers on transit-oriented development and transit station integration. Laura has authored provincial policy and is a leader in integration of public art in P3s; she created the procurement model used by Metrolinx and successfully implemented this process on a $6-billion capital infrastructure project, the Eglinton Crosstown LRT, in Toronto. Laura has created design specifications for capital construction projects and has applied this model to various procurement types.

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APPENDIX A. Detailed Methodology and Assumptions for 'Scenario 1' – Calgary Red Line Corridor Impacts

The method used to determine impacts in 'Scenario 1' looked at historical Calgary property values related to Calgary Red Line corridor impacts and generated a low, or conservative outcome for the Green Line: 0.7% property value increase year over year. The note below describes in more detail the analysis undertaken for Scenario 1.

1. Gather and Sort Data on Historical Assessed Property Values

A list of all the properties within an 800-metres radius to each of the planned Green Line LRT stations was provided by the City of Calgary. (All data is anonymous and cannot be traced to any one individual. No personal, demographic or economic data is tied to the property data provided by the City.) The following meta data were available for each property:

a. Roll Number (ID used by the city. 9-digit numbers reflect assessed properties, while 6-digit numbers reflect assessed businesses—all businesses have been culled from the list)
b. Condo Project Number
c. Full Civic Address
d. Tax Status
e. Property Type (land only, or land and improvements)
f. Property Use (commercial—retail or office, single-residential, multi-residential[55], institutional, transportation, industrial, linear—formerly designed industrial, recreational, municipal school or environment reserves)
g. 2020 Assessed Property Value
h. Building Total Area
i. Land Parcel Area
j. Geographic Location (longitude and latitude)

The City of Calgary's property tax rates are applied to three categories of property uses: a) residential, b) non-residential, and c) farmland. To understand the effects on the City's property tax base as the central question of this study, only commercial (retail and office) and residential uses will be assessed. All other uses are excluded from this study. 2020 tax rates for both the municipality and province is used for estimates in this study.

Figure 167 – City of Calgary 2020 Property Tax Rates

The City of Calgary's property tax rates are applied to three categories of property uses: a) residential, b) non-residential, and c) farmland. Rates with an asterisk (*) are before the 1.5% municipal tax rebate approved by Council in November 2019.

Assessment class	Municipal tax rate	Provincial tax rate	Total tax rate
Residential	0.0047795*	0.0027428	0.0075223*
Non-residential	0.0158278*	0.0035795	0.0194073*
Farm land	0.0206458*	0.0027428	0.0233886*

[55] It was found that some properties were categorized as single-residential, though upon further desktop-review, are actually multi-family residential property types. For these properties, a condo project number is also assigned, which validates the check. As such, any property that was initially categorized as single-residential and also has an assigned condo project number, the property is reclassified as multi-family residential for the purposes of this study. This has an affect on overall uplift estimates because uplift potential varies by property type (in addition to proximity to station). For example, within 100-metres to a Red Line LRT station between 1998 to 2016, a multi-family property on average saw value increases by 16 to 20%; while a single-residential property values increased by only 4%.

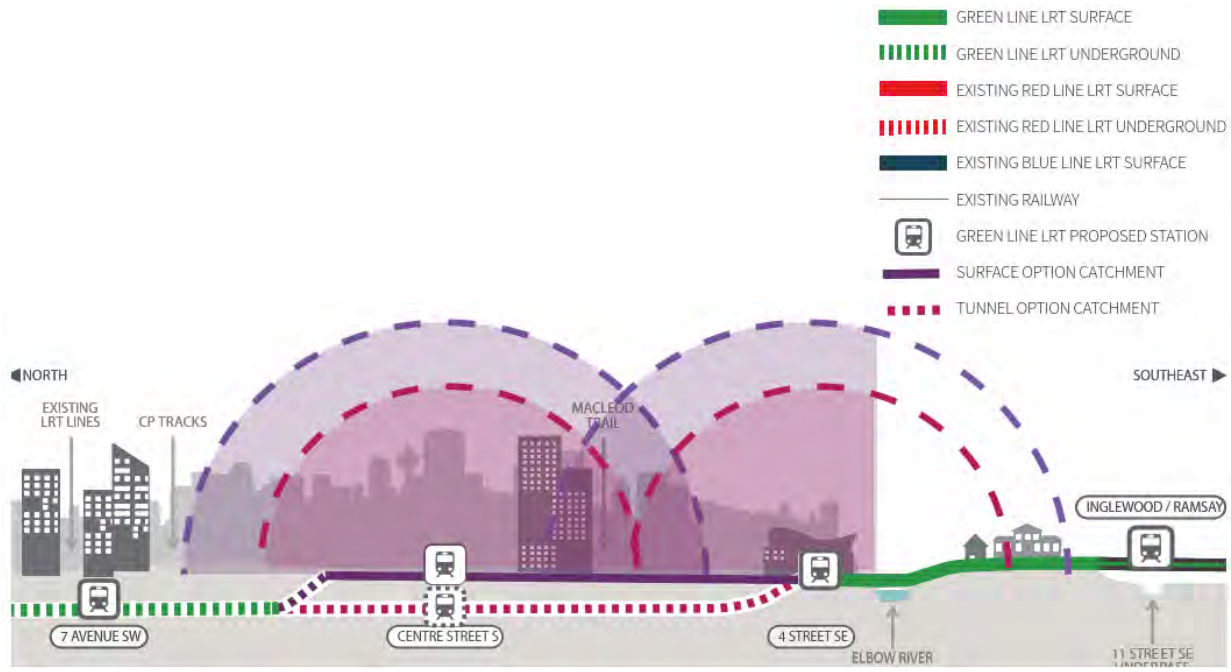
To estimate for potential value uplift utilizing the Red Line Hedonic Analysis, a property's use and distance to its nearest station are required. Each property's distance to a station was determined in terms of *actual travel distance* and its *straight line distance* utilizing a custom computer script in conjunction with Google Maps API. It is important to understand the difference between actual travel distance (i.e. driving and walking distance) and straight line distance (i.e. the typical radius distance from a station that defines a station catchment area in plans and policies).

For example, a property that appears to be within a 160-metres radius, or straight line distance, to its nearest transit station may appear to be well within reach of TOD benefits. In contrast, the actual travel distance is 2-kilometres. Therefore, this example property may have high proximity to transit, but its access is actually much lower. The Red Line Hedonic Analysis has found that property uplifts are estimated most accurately when both proximity and access measures are considered together.

A property's straight line distance to its nearest station may be representative of 'air borne' impacts such as noise and vibration. While, actual travel distance reflect 'access' benefits such as increased connectivity and ease of access.

Once, a property's distance to its nearest station was determined, two different station catchment areas were defined to distinguish between a surface and underground Green Line LRT Station based on distance. A surface station is defined by an 800-metres distance, while an underground station is defined by a 650-metres distance. The difference in catchment area between the two types of station designs reflect the difference in actual travel time for a transit rider. For example, a transit rider at an underground station can expect to spend more time underground, due to the additional vertical circulation required, before actually reaching its final distance or boarding/alighting a transit vehicle. The difference of 150-metres (800-metres less 650-metres) is representative of approximately 1 ¼ minutes in additional travel time assumed for the underground station. The possibility of underground retail-commercial concourses is not considered in this study. See Figure 28.

Figure 17 – Difference in Catchment Areas between a Surface and Underground Station Design



2. Evaluate Trends to Property Value due to TOD Benefits

At this stage, the initial list of properties has been sorted by existing land use and distance to its nearest station, and culled for potentially-impacted properties depending on whether they fall within the defined catchment area by station design type. (Properties with a tax-exempt status were also culled from the assessment.) With this, an appropriate *potential property value uplift percentage* is then determined utilizing the observed historical trends in TOD uplift due to the Red Line LRT.

In summary, a property's potential uplift in value is determined by matching the property's use and distance to a station to the corresponding observed historical uplift percentage as determined by the Red Line hedonic analysis. See Figure 29.

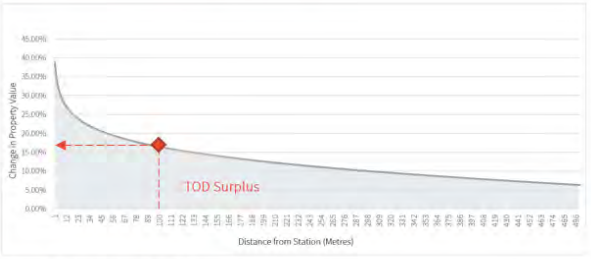
Figure 18 – Applying the Effects of the Calgary Red Line LRT to Estimate Impacts due to the Green Line

Example Subject Property

(Being assessed for potential impacts due to the Green Line LRT)

- Inputs:
  - Property Use = Multi-Residential
  - Actual Travel Distance = 100-metres
  - 2020 Assessed Property Value = $1 million
- Outputs:
  - Potential Property Value Uplift % = 17%
  - Potential Property Value Uplift $ = $1 million x 17% = $170,000
  - Potential Total Property Tax Rate for Residential Class Properties = 0.67%
  - Potential Property Tax Revenue Surplus = $1,131

Multifamily Property Value Uplift



Source: Red Line Hedonic Analysis

3. Extrapolate Trends for Potential Property Value Uplifts due to the new Green Line LRT

Finally, the identified corresponding uplift percentage is then a) applied to the property's current 2020 assessed value to estimate for its potential, and then b) used to estimate for potential property tax revenue surplus. The overall impact to properties due to the new Green Line LRT is indicated by the sum of all potential property value uplifts and tax revenue surplus, respectively.

These indicators are representative of *after construction* effects and are compared against current baseline conditions *before construction* in terms of 2020 assessed property values (and 2019 property tax rates).

i. Adjustments and Limitations of the Analysis

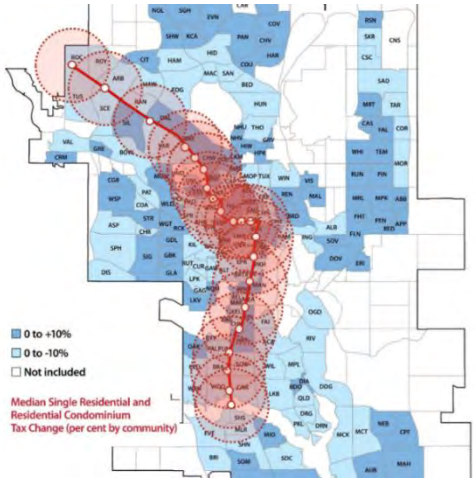
The limitations of our analysis are reflective of limitations that generally apply to all land valuation exercises for large-scale infrastructure projects. Estimating the long-term value of land involves factors beyond applying proximity benefits. These additional factors may include: the availability of funding, investor confidence in the ability to deliver the infrastructure, present and future highest-and-best-use of land, market supply and demand, macro economic conditions, and the quality of the investment itself.

While some impacts are easy to quantify, others are simply not. This is acknowledged as a limitation of the study but opens up a broader conversation about 'how' the Green Line can be built; through a process that encourages stakeholder engagement, transparency, community involvement and accountability.

The following are adjustments made to apply the Red Line Hedonic Analysis for the Green Line Property Impact Assessment and address limitations of the analysis.

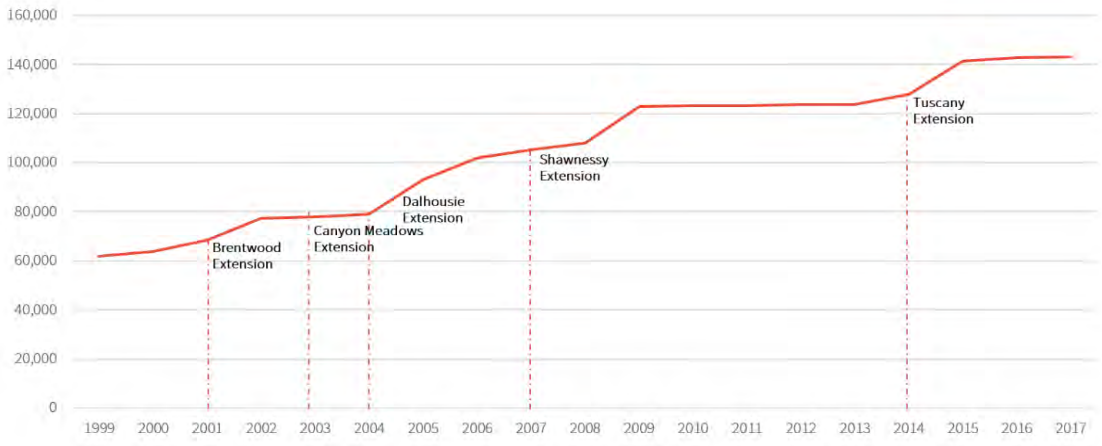
1. **Calgary's 'Boom-and-Bust' Economy:** Total potential uplift of property values due to a new LRT project like the Green Line is fundamentally contingent on Calgary's economic environment which is uniquely characterized by market 'booms-and-busts'. To date, the City is experiencing a gradual decline in its economy where its property values have yet to return back to historical peaks. To address this major externality, the property value uplift trends utilized in this study are based on historical, local data and are taken across a long-range period (of 18-years) to capture the effects of multiple booms-and-busts specific to Calgary's market. By doing so, the assumed potential property value uplift percentages include rate of inflation and other market drivers that will continue to apply to property values in Calgary when looking forward from 2017-2020 and after the construction of the new Green Line. As such, estimated property value uplifts are not discounted.

2. **Comparable Transit Improvements:** It should be noted that the time period of which the Red Line property value impacts were studied is from 1998 to 2016, an 18-year period. The Red Line was first opened in the 1970s and its network was not as extensive as it is today. Therefore, the property impacts estimated in this study (due to the Green Line) are reflective of value uplifts due to an *existing, mature (Red Line) LRT system.* Having said that, during the studied 18-year period, the Red Line system has undergone multiple service enhancements and network extensions with additional stations. See Figure 30. Potential value uplifts estimated due to the *new Green Line LRT system* are still comparable and arguably more conservative for the following two reasons:



   a) The new Green Line LRT will provide a significant step-change in transit access and service to some high-growth potential neighbourhoods such as the Beltline area, and still significant benefit to neighbourhoods where there is already some existing transit service due to the improved connectivity between homes and high-value jobs concentrated in the downtown area. In turn job connectivity is improved in areas with better transit access.
   b) The new Green Line LRT will be designed for better mobility (i.e. low-floor fleets) and better integration with the surrounding public realm and built environment.

Figure 190 – Increase in TOD Properties as the Red Line LRT undergoes Network Extension from 1998 to 2016



3. **Focus on Commercial and Residential Land Uses:** This study focuses only on properties that are designated as commercial or residential uses and excludes all others.[56] This was done for two reasons. First, the focus is applied to address the central question of "what is the impact to property values and its resultant *property tax revenue base*?" In Calgary, property tax rates are applied to three categories of land uses, only: a) residential, b) non-residential, and c) farmland. This study addresses the non-residential category through an assessment of commercial properties, which includes retail and office. (For planning purposes, the non-residential category is typically captured and referred to as Industrial Commercial Investment (ICI) land uses. Industrial uses have been excluded in this study. There are few industrially-designated properties in the data set being assessed and its inclusion would represent an outlier. Furthermore, industrial land uses do not typically benefit much from increase transit access, and are often times converted into higher-and-better-uses in response to the market and due to the additional transit benefits.) Second, the property data set provided by the City for this study does not differentiate between commercial-retail uses and commercial-office uses. As such, when applying the Red Line hedonic analysis which does differentiate between retail and office uses, the uses are combined into a blended uplift percentage to represent the commercial land use category, overall. See Figure 31.

Figure 201 –Blended Uplift Potential for Commercial Properties Overall

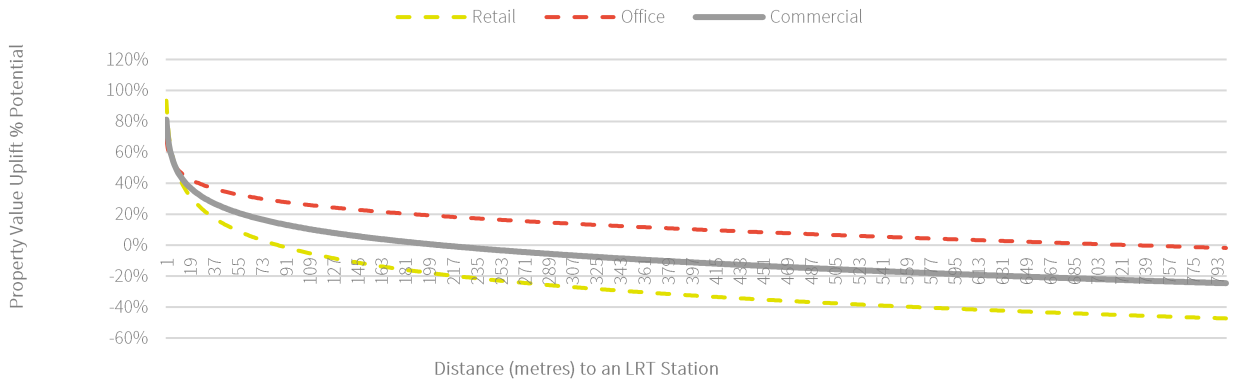
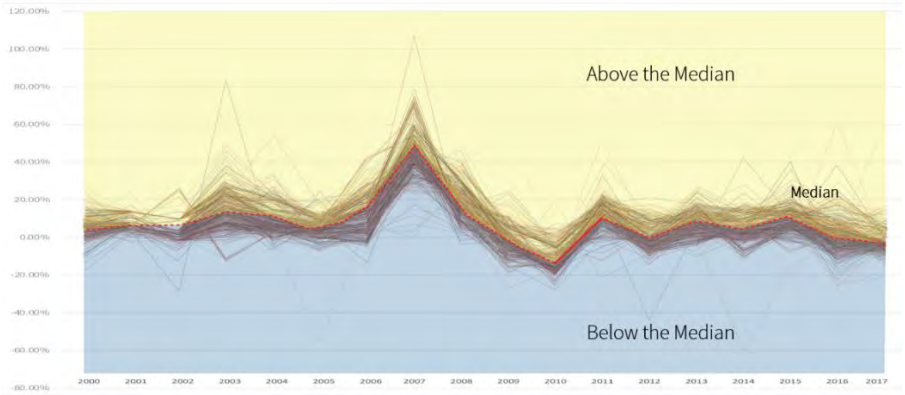


Figure 212 – Annual Property Value Percentage Change Relative to the Median (Red Line Hedonic Analysis)



[56] All other uses include municipal, school and environmental reserve lands; transportation; industrial and institutional uses.

4. **Understanding Negative Impacts:** The blending of property value uplift percentages for retail and office uses helps to address another limitation of the analysis, which is the observed negative impact (negative property value uplift) to retail properties specifically. For retail properties that are located beyond a 100-metres reach to a station, impacts to property values are increasingly negative. This trend can be explained by the effects of increased market demand for higher-value land uses closer to the transit station. The significant increase to retail property values that are located closest to a transit station reflects both an uplift in value to existing retail properties, but also the *creation* of additional property value through induced development. This is evidenced by the increased number of properties nearby the Red Line LRT following each subsequent network extension.

   As well, a negative impact may not necessarily indicate a loss in value for that specific retail property. The trend for property value uplift percentage was determined relative to the *median value* of all properties by land use . (The data was structured this way so that a regression analysis, as part of the Red Line hedonic study, can be undertaken to control for expensive, outlier properties and multiple market cycles.) As such, a negative percentage change may be reflective of a property's value relative to the substantial increase in property value (either through uplift or new value created) for the properties closest to a transit station.

   To estimate for potential property impacts due to the Green Line for this study, if a property is matched with a corresponding negative uplift percentage, the change will be capped at 0%. (This will specifically apply to both retail and single-residential uses. All other uses studied exhibit a positive uplift potential.) Even with a 0% cap on any negative uplifts observed, this would still be considered *conservative* because it eliminates estimates for any property appreciation due to inflation that may have otherwise still been possible for those properties.

   Lastly, negative uplifts are capped at 0% because although the property value is based on current use (which deteriorates proportionate to its distance from the LRT), these properties will have market appeal when considered for a different use or as part of parcel amalgamation for a higher and better use.

Using the hedonic approach for this study, a negative impact may not necessarily indicate a loss in property value. Instead, it reflects a property's value relative to the median value of all properties of that specific land use, which may include increased densification and value creation for properties located closer to transit.

At the same time, we do recognize that the Red Line is also quite different from the Green Line, and those differences do have an effect on property values. The majority of the Red Line is located down the middle of Crowchild Trail, a very wide road, or along an existing rail track further down south. In comparison, the Green Line will be the second rapid transit line in Calgary, after the West LRT, to be located through and within urban communities—bring transit closer and more accessible to people. Therefore, in comparison to the Red Line, there is likely to be greater property value uplift potential due to the Green Line's ability to physically connect and integrate better with its immediate physical surroundings.

APPENDIX B. Economic Improvement Through Placemaking

Supported by literature review and case studies; design decisions at the street-level are noted to be the most positively impactful to commercial and residential properties. How well-integrated the built-environment and its urban design is with the transit system will be a major determinant to whether the new Green Line LRT project will have a positive or negative affect on nearby properties in the long-term.

Often, the design of the transit station is not well coordinated with nearby development projects to maximize and capture the benefits of transit oriented development. There are many challenges as to why transit oriented developments are difficult to realize for municipalities, designers, developers and transit authorities. One of the main challenges is a misalignment and lack of transparency in the planning of station areas (driven by municipalities); timing and coordination of city-shaping projects (driven by the market and other economic forces) ; station buildings and infrastructure (driven by transit authorities); and the surrounding real estate (driven by developers who are beholden to market demands and other economic externalities.)

Most of these challenges can be resolved, but solutions to better align planning work and capital improvements with market forces will require collaboration between the various stakeholders that have a vested interested in creating a vibrant and productive transit-oriented community. Success will be determined by design decisions related to the interface between people and the built environment at the neighbourhood-level. Important questions include:

- How do people travel between stations and buildings?
- What is their 'last mile' journey experience as they go to their final destination?
- Are there attractions and convenience amenities along the way?
- How easy is it to locate and navigate to an actual station entrance, to purchase a fare ticket, etc.?
- Is the connection between stations, streets and buildings convenient, safe and delightful?

These have been the same questions The City's Green Line City Shaping team has been asking when providing project inputs into the Technical Performance Requirements (TPR)/Reference Concept Drawings (RCD). Some of these decisions can be address through station designs now. However, some will need to evolve as development around stations get built out (i.e. attractions and convenience amenities would likely be provided by the private sector, and would be beyond the Green Line transit project scope).

Long-term benefits are a key point when discussing transit projects that require a longer timeframe to realize the ultimate upside. Often times, due to the longer timeframe, transit projects go through the ups and downs of multiple market cycles.

> *LRT cannot reverse the economic decline of an area. An oft-cited case of this phenomenon is the Buffalo Light Rail Rapid Transit in New York: the transit system did not create the anticipated development needed to revitalize Buffalo's city centre and reverse its population drain.*[57]

Furthermore, it was found that property value uplifts occurred only up to a certain distance from the station, and were greatest if the area was significantly underserved by transit. For example, the case study on Hudson-Bergen LRT in New Jersey, USA found that property value appreciation was found to be only within a 400-metres radius, and negligible around stations that were already well-served by transit.[58] Current land use policy in Calgary

[57] D.B. Hess and T.M. Almeida, Impact of Proximity to Light Rail Rapid Transit on Station-area Property Values in Buffalo, New York. Urban Studies, 44(2007): 1041-1068.
[58] Brookings Institution, HDR, Reconnecting America, RCLCO. Value Capture and Tax-Increment Financing Options for Streetcar Construction. 2009.

recommends a focus for transit oriented development within the area of 200 to 300-metres to a station. The intent is to provide a large area for potential impacts to be realized, while controlling the spread and quality of investment with the City's public realm dollars.

New LRT stations were also found to create market demand for certain real estate products that would have otherwise not been viable, like new commercial office space. Underutilized land around stations are converted and redeveloped into higher-and-better uses, often with compact, pedestrian-friendly, mixed-use developments that would have not otherwise been supported by a local road network.

i. Role of Place Making and Urban Design

The following section highlights the importance of placemaking and the impact it has on the ultimate success of the proposed alignment through the study area. By transforming passive spaces into destinations and by enhancing the urban environment within and around stations, there is an opportunity to increase the perceived value of these spaces. Empirical evidence suggests that transit ridership will increase if the distance between transit stations and buildings are short and the route is more pedestrian-friendly.[59]

> *The actual supply of transportation infrastructure and transit-oriented land use development is dependent on a host of factors, such as public expenditures on transit, permissive zoning, and development incentives. But given their fundamental mutual dependence in the urban system, we argue that a rapid transit station area's accessibility and built environment characteristics combine to result in a spatial basket or bundle of transit oriented development goods around transit stations.*[60]

Creating the right pedestrian experience anchored by access to mass transportation requires an understanding of what is driving the lifestyle needs of modern residents and workers: convenience. Today's thriving transit-oriented developments are defined by amenity-rich spaces that support a shift toward work-life integration where features to support work-from-home arrangements, and office spaces that incorporate lifestyle services enabling workers to grab a coffee, get in a workout, or meet up with friends.

Over the past decade, placemaking has seen recognition as an effective economic development strategy and opportunity to develop and market a community's brand. From redeveloped areas around mixed-use centres to master planned cities, well-designed, authentic, and accessible places can differentiate one community from another. By capitalizing on local assets, economic developers have created quality places where residents want to live, work, and play. The creation of vibrant communities has resulted in social and workforce benefits that translate into economic gains.

Placemaking is based on two core principles. First: with the right tools and guidance, community members can initiate and implement changes on their own. Second: Placemaking draws on the unique assets inherent in each community. It recognizes residents' deep knowledge about the place where they live, producing a sense of collective pride and ownership. Using these strengths to work toward common goals involves everyone in the process and results in high quality projects that succeed both commercially and socially. A placemaking approach to

[59] Cervero, R., Aschauer, D., and the Transit Cooperative Research Program. Economic Impact Analysis of Transit Investment: A Guide for Practitioners. 1998.
[60] Higgins, C., & Kanaroglou, P. (2018). Rapid transit, transit-oriented development, and the contextual sensitivity of land value uplift in Toronto. Urban Studies, 55(10), 2197–2225.

development is emerging as a cost-effective way to revive prosperity in communities. It marks a fresh alternative to the way economic growth and urban growth have been approached over recent decades.

Urban design intersects the disciplines of planning and architecture, with considerations for occupancies and uses within the public realm. Good urban design is more than just stitching together a cityscape. Urban designers should configure networks that anticipate change; a framework of transport, built form and other features, which will create natural locations for things. Urban design structures the activities of day-to-day life. Excellent urban design elements, when combined with a transit network through the application of integrated design, help uplift property values and mixed-use development potential.

All placemaking activities have the potential to improve local quality of life and attractiveness for additional new development or redevelopment. But considerable study of high-quality places around the world demonstrates that projects and activities with a physical form that is appropriate for its context (human scale design supportive of active transportation, and representing land uses that serve a compatible function in the place they are proposed) have the potential to enhance economic and community development of a particular area. The distinction is critical because communities affected by years of disinvestment desire the property tax uplift derived from new development. However, new development without supportive, human-scale features, or in the wrong location, may compound the issues. Unless new development with good form is carefully sited and well-designed, it will underperform in its ability to attract additional development and positive economic activity.

ii. Trends and Changes

As new transit lines prove to be a magnet for real estate developers and investors, the industry is paying more attention to the idea of placemaking. In many ways, it is an evolution of the industry's recent focus on mixed-use properties and creating communities, fusing residential, commercial, retail and service properties.[61] What makes placemaking different is that it is more than a collection of different types of property; it is about creating a unique experience and culture. New transit spending is creating opportunities to establish engaging environments along new and future lines. Large, dense, transit-oriented developments are examples of placemaking in action and are attractive to investors.

Economic development strategies aimed at attracting highly skilled workers through investment in urban amenities and placemaking are gaining momentum.[62] Much of the foundational research has been tested in very large cities, both in the United States and internationally. This research suggests that quality of place factors[63] associated with better human capital outcomes in prior literature focusing on larger cities were also significant predictors of better human capital outcomes in midsized cities.

There is a trend toward the 18-hour city, sometimes known as the "long day/seven day" city, which has been described as a less intense version of so-called 24-hour cities like London, Paris, Berlin, Tokyo, New York and Toronto. While this concept isn't new, it is relatively new to Canada. The prototypical 18-hour city is a major centre with an international character that has managed to retain a vibrant urban core. These cities also tend to have robust and integrated residential, commercial, retail, services, entertainment and cultural amenities that allow

[61] PwC and the Urban Land Institute. Emerging Trends in Real Estate: Canada and the United States 2020. 2020.
[62] Janey Kelly, Matt Ruther, Sarah Ehresman, Bridget Nickerson. Placemaking as an Economic Development Strategy for Small and Midsized Cities. 2016.
[63] RATIO. Public Spaces Designed for All Demographics Anchor Local Economies. 2016.

people to enjoy themselves well into the night. Currently, Vancouver and Montreal fit this idea of the 18-hour city—though Calgary is also making a solid claim to this status.[64]

Key to an efficient lifestyle is the linkage between multiple transit options. Trains often serve as the anchor, but increasingly those embracing transit oriented development are looking at other complementary modes, including shuttle services and bike-share programs, that improve connections at transit hubs, support sustainable transportation, and contribute to a seamless living experience. These additional transportation options also foster viable development farther away from train stations, linking buildings that fall outside of a transit oriented development's standard 500-metres radius to the downtown district, without requiring use of a car.

In defining the desirable elements of mass transportation, it is critical to place special attention on the quality and experience of the transportation itself. While the transit oriented development talk tends to be mostly about trains, it is important to focus on the many municipalities whose main form of public transit is bus or light rail. The efficiency of the trip overall, the comfort and quality of the interior design, both of the vehicle and the station, and most importantly, the necessity for technology to enable the user to conduct business during the commute, are all factors that must be addressed as the growth in transit oriented development trend continues.[65]

iii. Enhancement and Mitigation Strategies

City shaping initiatives must occur at the corporate level, across business units and other disciplines. Though the Green Line project invests in the underlying station facilities and infrastructure within the station areas, placemaking requires extensive municipal investment. The City of Calgary is currently developing these processes, though they are complex and may involve fiscal mechanism on private investments.

Municipalities that embrace the core tenets of placemaking and prioritize the pedestrian experience are best positioned to create and sustain successful transit-oriented development and realize the property value benefits that typically accompany transit investment. To do this, municipalities must put the needs and wants of people first and satisfy their desires for rich and varied experiences that allow them to move easily between all aspects of their lives. Equally important is the creation of pedestrian-oriented services that link people to mass transit and support a walkable environment. To achieve these goals, municipalities must recognize the need for, and implement zoning that encourages, residential and commercial development that fosters work-life integration.

As municipalities look to facilitate redevelopment, it is vital that they embrace the creative design process offered through the pathway of the designation of redevelopment zones. As developers seek to deliver the most suitable product, which today is defined by flexible, collaborative, and creative spaces, local administrations must respect the fluidity that the design process entails which frequently is left unmet by outdated zoning. The implementation of an effective transit-oriented development incorporates elements and considerations that cater to a variety of end-users. The success of these redevelopments can only be achieved through an integrated public-private partnership, whereby both the developer and the municipality are able to succeed in their equitable end goal of creating a thriving, stabilized asset that generates not only much-needed tax revenues for the community but also supports a dynamic population invested in the success of the location.

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[64] PwC. Rethinking Real Estate and Affordability. 2018.

[65] Mixed-use transit-oriented developments are becoming increasingly more desirable in urban spaces. Apart from increased accessibility to jobs and activities, benefits of these neighborhoods include significant cost-of-living reductions. Transit-rich neighborhoods that are designed to be more walkable, and have higher retail and amenity density, reduces the number of households that rely on privately-owned vehicles. Across the seven study regions, one in four households did not own a vehicle. On average, a household in a transit-rich area spends $2,500 to $4,000 ($USD) less on transportation per year. http://www.njtod.org/the-real-estate-mantra/

The execution of an effective place-based approach has inherent challenges. A successful approach ideally comprises of the following aspects:

- Strong communications and engagement programs
- A variety of good transport links, with multi-modal options
- Public and private sector working together
- Strategies to ensure that all communities benefit from the economic success

Determining what a place-based strategy should focus on starts with identifying what the location provides in terms of key assets, services and growth opportunities that shape day-to-day-life and economic opportunities.

Proposed mitigation strategies to attenuate for negative impacts:

- Physical connections/accessibility
- Anchors/destinations
- Visibility/wayfinding/branding
- Digital integration/lifestyle/convenience

The best practices are, to a significant extent, specific to the communities in which one is working. During the planning process, local administrations should be open to collaborative consultation, listening to residents and businesses to understand needs and high level objectives, using communities as sources of information about those places and how they function and what they want, and bringing back the best data and the most creative ideas for solving the needs that have been identified. It is important to understand that communities function well as editors but are less successful as creators.

The biggest challenge to implementing placemaking strategies is the financing, as a placemaking project requires the inclusion of elements that do not produce as much revenue as it could have in a different scenario. That may mean having more open space that does not produce revenue or bringing in an emerging small business tenant to attract other desirable tenants. Private and public sectors working together to find the right solution is key. There's a misperception that placemaking is an enhancement to otherwise conventional design work, and with the idea of enhancement usually comes the perception that one must spend more money. Placemaking is a mind-set that can be brought to every project, from small to large scale.

The biggest misconception being disproved by market economics today is this notion that if you simply put retail in the base of the building, you are placemaking. That has been proven to be unsuccessful. Successful placemaking means offering people a place to exchange ideas as well as goods and services. A place must balance transaction and reflection to best serve the needs and expectations of current generations. When good urban design is implemented, the development community benefits because the value of their real estate goes up, and the community benefits because they can have a space in which they feel like they are welcome.

APPENDIX C. Interview with Local Calgary Real Estate Professionals

The team has conducted interviews with Calgary-local real estate investors, brokers and valuation appraisers to understand their 'real-world' lens on the set challenges already existing and anticipated for the Green Line LRT project.

i. What are the types of transit-related impacts to properties?

- All respondents generally agree on what actually impact properties and their valuation (i.e. proximity to station, ease of access, etc.) Of highest concern is "Ease of Access" followed by "Transit System Design." Both are closely related and are not mutually exclusive.

"Ease of Access" needs to be defined specifically within the context of Calgary as ease of access for:

- pedestrians between transit station/services to nearby properties;
- cyclist when passing through the station area
- drivers when passing through the station area, or to access specific buildings functions such as back-of-house servicing or parkades

Surface stations and portals to underground stations are generally perceived to be a negative impact (i.e. will become an infrastructural barrier and impediment) of the downtown commercial area because of their access concern. This is of specific concern at Riverfront Avenue SW and 2 Avenue SW.

The Green Line design team needs to be sensitive to how the system is designed to interact with the public realm and streetscape, and the travel experience by each user type (i.e. whether you're a pedestrian, cyclist or driver). A pedestrian is likely to value design considerations such as a weather protected connection. The vitality of the ground floor plan and the +15 connections are unanimously emphasized as a major consideration and concern for Calgary, and especially because of the significant amount of public-private spaces unique to Calgary.

An additional mechanism that should be noted, but is largely an uncontrollable mechanism, is the Calgary real estate market. As such, leasing remains a significant challenge and hurdle currently and anticipated for the coming years.

There is unanimous concern that if the transit system and its station is *not* "well designed" it is assumed that commercial (office) properties located *away* from the new LRT corridor would be *more* attractive to prospective tenants (i.e. properties one-block away at 8 Avenue SW or 9 Avenue SW. If poorly designed, transit can be a barrier which limits access and constrains property values. For example, the streetscape along 7 Avenue SW with existing LRT is considered derelict with unsavoury sights. There remains low-confidence and uncertainty around the project design (and its mitigation/placemaking measures).

ii. Have property values been impacted since the Green Line's announcement and funding commitment?

- All respondents generally noted *no observed change* in market prices due to the activities of the new LRT project to date.

To note, the project was initially announced as an underground LRT corridor back in 2016, which is was generally perceived by the public as a positive impact to property values. A surface transit system design was perceived as a negative impact. Only two specific properties (Ramsay at 10 Avenue SE and 11 Avenue SE; and Douglas Glen) were

noted by the interviewees as having seen any positive change to property values, although it is not clear if this is attributable to the perceived benefits of transit oriented development, and the incremental change is not significant (less than 1%). Furthermore, market conditions in Calgary have worsened over the last 5 years—making it difficult to assess and isolate for the benefits of the new LRT project

The speculated understanding of why the Ramsay property saw some sort of increased change in its market value is premised on the property already having an existing easement for the Green Line which was in place before the project's announcement. A possible conclusion to why there has been no significant shift in market values due to the new LRT project is due to the lack of public/market confidence and/or awareness of the design and implementation of the project. There is no clear messaging to the market on a "definitive" alignment, location of stations, and the overall design of the system

It was agreed though, that the Green Line project is not perceived as a "top-of-mind" risk factor when evaluating the risk profile and valuation of properties

iii. Is there a price premium for properties that exist along an LRT corridor today?

- There is no notable price premium, and/or higher-density intensification of transit oriented development sites that are along, or nearby existing LRT, and if there were, this is likely attributable to other factors, such as proximity to universities and other destinations/anchors.

For example: the new, Manulife building at 707 5 Street SW is located adjacent to an LRT corridor and is currently significantly vacant, with only one tenant across two floors. While a comparable property, 8 Avenue Place, which is located one block north and less close to the LRT corridor, is almost 100% leased with notable lease renewals.

It was noted that there are some office properties outside the downtown area that have higher rents than some downtown properties along the existing Red/Blue Line LRT. Another note made was that the Red and Blue Line serve different markets. The market sounding group have observed the greatest property value uplifts in areas where there was limited access to transit before the introduction of additional transit access and capacity. As such, there is likely little impact to the downtown core with already existing LRT access. Nevertheless, all were in agreeance that if the LRT system is designed "right", there can be anticipated positive impacts, i.e. integrated planning and design between transit and an institutional anchor like a university. Generally, whenever (transit) access is limited, that is where a new LRT project can create the most value. The three Green Line station areas that currently have limited LRT access are Centre Street North, Beltline and Eau Claire area.

iv. Is there more market demand for development along an LRT corridor versus a corridor without?

- There does not appear to be a differentiated preference for developing along an LRT or non-LRT corridor due to the Calgary market. Development decisions are influenced by how the transit infrastructure is designed, and if it is delivered poorly and below the public's expectations. Developers may choose to delay their development plans until certainty in the project is improved. Or, proceed with a building design that misses out on the opportunity for valuable connections and functional integrations with the transit station.

There is a surplus of developable land, where the value proposition for development is similar. Though fundamentally, the market demand for higher-density development is just lacking. Generally, the benefit of transit oriented development is seen as a checklist item when prospective tenants evaluate lease options, which doesn't necessarily imply the property needs to be immediately adjacent to a transit station. For the properties located

along an LRT corridor, it was noted that recent or new development have been/would be designed in such a way so that its common areas and amenities (i.e. Market entrances, lobbies, parkade entrances) will be oriented away from the LRT corridor.

The Westbrook transit oriented development project, along the West LRT Line, is highlighted as possibly the "only true transit oriented development project" in Calgary to date, where the property and its building are integrated with an underground station on the Blue Line. However, this project is a case example of an unsuccessful approach and outcome to realizing transit oriented development and its potential uplift in values. When the City first went to market with the Westbrook proposal, there were many prescriptions placed on the development scheme (i.e. construction timing, use and siting clauses). This was a major deterrent to the market, and before the project could take-off, the Calgary market began to experience its downturn.

Overall, the West LRT Line has seen a lot of new/induced development due to transit oriented development benefits. The line is located in an affluent, predominantly single-detached residential neighbourhood. The respondents also noted that there are 3 to 4 other transit oriented development sites that the City is trying to develop but are unable to overcome the hurdle of the fundamentally lacking market demand. The private sector is experiencing the same hurdle and have seen development on hold over the last 5 years. Residential opportunity was identified nearby the Saddledome site

v. Has development activity slowed down because of the Green Line LRT project?

- According to the Globe and Mail crane count tracker, Calgary was 6th on the list. This is evidence that there are still projects proceeding regardless of a new LRT project. However, it does not reflect the Calgary real estate market's negative absorption, oversupply and historically high vacancy rates for multi-family and office developments, which are the types of projects being developed.

- Generally, it was agreed that the Green Line is not a detriment to development activity. However, without confidence and certainty in the design and implementation of the Green Line project, it will remain a risk item for real estate investors and developers, and thus development that would have otherwise been planned along the LRT would likely be deferred.

The majority of developments are 4 to 6 storey multi-residential housing. However, housing inventory in Calgary has been high since 2012, forcing some condominium projects to be converted to rental mid-way through. Currently, very little office being developed given the historically high office vacancy today. However, it was noted that the long term view of the Calgary office market is still fundamentally strong. Retail and industrial development are focused in greenfield sites.

Confidence and certainty in the Green Line project as noted by the market sounding group were driven by these localised impacts:

- The risk of 7 Avenue SW becoming unsafe for pedestrians and cyclists, decreasing general foot traffic, visibility potential, attractiveness of an area, and business activity.
- The risk of further isolating the 'island effect' of Eau Claire Market by worsening 2 Street SW, which is the primary access the area. The main concern here is the possible impediment to parkades and other vehicular logistics
- The perception that a surface station together with the portal and its associated barriers as a result of the infrastructure design, is not appropriate for an area with high-density development (i.e. 20 FAR, floor area ratio)

- The perception that an elevated LRT bridge will take away from the desirability of the parks and riverwalk in the Eau Claire and China Town area
- Placemaking design with a focus on enhancing the public realm together with transit, is viewed as the top mitigating measure to the above concerns.

If the right measures and design were implemented and the Calgary market recovers, then transit oriented development sites around the Eau Claire Market may be developed in 4 to 5 years out.

vi. Can property values be negatively impacted by the design of the LRT system?

- Impacts to property values need to be understood within the context of risk. From an investor's perspective, *assessed* property values would be negatively impacted by a *poorly designed portal* in the form of potential revenue lost, either because of increased vacancy from tenant turnover and/or inaccessible paid-parking stalls. If the perceived risk of the Green Line project is high, appraised property values will be even less.

- All respondents generally agree that potential negative impacts to property values would be due to impediments to a user's "Ease of Access" around/through the station area, and that this is driven primarily by the "Transit System Design."

Construction disruptions to businesses and leases will reflect in property values in the following cycle, typically quarterly or semi-annually given that typical lease terms are 5 years long. Currently, real estate valuations are already underwritten with the assumptions of 12 to 24 months periods for lease-up on Class AAA offices located in the downtown Calgary. It was noted that a significant portion of the property tax base is composed of high-value commercial properties. This is because the tax rate for commercial properties is much higher and was noted to cost property owners almost 48% of their total rental revenue is for tax payment.

It is perceived that tunnel portals and surface stations will negatively impact the ease of access to properties and that it will vary by the user type:

- Pedestrians and cyclists accessing the collective station area, public realm and private properties; safely and comfortably
- Drivers passing through the collective station area and accessing specific properties and their amenities, i.e. parkades and loading.

The rationale provided by the market sounding group include:

- After construction: Increased congestion along the alignment, due to the restriction to traffic capacity with the implementation of a surface station and/or portal. The infrastructure will become a barrier to the public realm rather than enhancing assets.
- During construction: The construction impacts of a surface station and portal will be significantly disruptive and this will impact the commercial leasing desirability along the entire alignment. (This is in comparison to tunnel boring construction method for underground stations—although this is usually a misconception: that tunnel boring construction methods do not require cut-and-cover). This is of specific concern at Riverfront Avenue SW and 2 Avenue SW.

Construction impacts and its localized effect on properties, their value and tenants will vary by the streetscape:

- The pedestrian streetscape will need to be considered along the entire alignment regardless of the market area, and especially in and around public amenities like the Prince's Island Park by the Bow River (the area is noted to be a popular destination for office workers, runners, pedestrians, and cyclists).
- There is a retail streetscape in the Beltline area and along the Centre St N segment that needs to be considered
- The vehicular street access to parkades in office buildings will need to be considered.
- It is easier to circumvent the congestion concern outside the downtown core.

It was noted that disruptions due to construction would decrease the desirability for prospective tenants to sign or renew a lease, given it is a tenant's market and there are many other alternatives, and the probability of a lease renewal would decrease from about 75% to 50%--which has an impact on appraised property values. Access will no doubt be compromised and cause problems for the property market over the 2 to 3 years of LRT construction.

The case example of utility upgrades along 17 Avenue SW was provided, where cut-and-cover construction led to full street closures for over 3 years. This, together with Calgary's sensitive economy, resulted in many business closures. The interviewees all recommended consideration for relief programs to offset business disruption due to LRT construction.

vii. Are businesses and tenants able to 'weather the storm' during station construction?

- ► It is currently a buyer's or tenant's market where the over supply of options allows the prospect to find other similar or better options easily, and this trend is anticipated to continue. This is regardless of an office, retail or residential asset or product. In summary, the market sounding group ended with the following over-arching thoughts:

- Be highly sensitive/conscious to localized impacts, it's all about the look and feel
- City of Calgary engagement with stakeholders could be improved
- Regarding the transit system design, we cannot cut corners—need to pursue the long term

APPENDIX D. Case Studies

A literature review of various North American LRT projects and their relation to transit oriented developments have been conducted to understand each case study's successes and lessons learned that are applicable to the Green Line LRT project.

Most of the literatures reviewed estimate the long-term impacts and benefits of transit projects using a variety of crucial factors, including the characteristics of the stations and their location, the type of clientele, and the quality of the service.[66]

Below in Table 12 is a summary of other illustrative examples of property value uplifts across other markets and studies in comparison to the Green Line estimates.

Table 92 – Other benchmark property value impacts due to light rail transit across other major metros

Authors	*City*	*Impact to Property Values*	
Hatch (2017)	Calgary	↑	Price of 12% within 800-metres to a station, over 18-years; highest gains within 500-metres 0 to 39% for residential properties 0 to 93% for commercial properties
Dewees (1976)	Toronto	↑	Price of $2,370
Bajic (1983)	Toronto	↑	Price of $2,237
Voith (1991)	Philadelphia	↑	Price of $6707 in New Jersey
		↑	Price of $3437 in Pennsylvania
Gatzlaff and Smith (1993)	Miami	→	No significant effect
Landis et al. (1994)	San Francisco	↓	Price of $2.29 and $1.96 per meter (linear distance decrease)
	San Jose	→	No significant effect
	San Diego	→	No significant effect
	Sacramento	→	No significant effect
McDonald and Osuji (1995)	Chicago	↑	Price of 17% within 1/2 mile (800-metres)
Benjamin and Sirmans (1996)	Washington DC	↓	Price of 2.5% for each 1/10 of a mile (160-metres)
Lewis-Workman and Brod (1997)	San Francisco	↓	Price of $15.78 by feet (linear distance decrease)
	New York	↓	Price of $23 by feet (linear distance decrease)
	Portland	↓	Price of $0.76 by feet (linear distance decrease)
Chen et al. (1997)	Portland	↓	Price of $32.20 per metre (linear distance decrease)
So et al. (1997)	Hong Kong	↑	Price of 3.2% if less than 10-minute walking distance
Haider and Miller (2000)	Toronto	↑	Price of $4,000 if within a 1km distance from the station
Baum-Snow and Kahn (2000)	USA	↑	Price of $4,972 for a diminution of 2km
Cervero and Duncan (2002)	Santa Clara	↑	(Commercial) price of $4.00/sq foot if within a 1/4 mile (400-metres)
Knaap et al. (2001)	Washington DC	↑	(Land) price of 36% if within a 1/2 mile (800-metres)
		↑	(Land) price of 9% if within 1 mile (1,600-metres)
Weinstein and Clower (2003)	Dallas	↑	Price of 39% if within a 1/2 mile (160-metres)
		↑	(Office) price of 53% within a 1/4 mile (400-metres)
McMillen and McDonald (2003)	Chicago	↑	Mean price of $6,000 within 1/8 of mile (200-metres)
Garrett (2004)	St. Louis	↑	Price of $139.92 for each meter from 1.46-km
Celik and Yankaya (2006)	Turkey	↓	Price of $4.76 per meter (linear decrease distance)
Hess and Almeida (2007)	Buffalo	↑	Price of $1,300 - 3,000

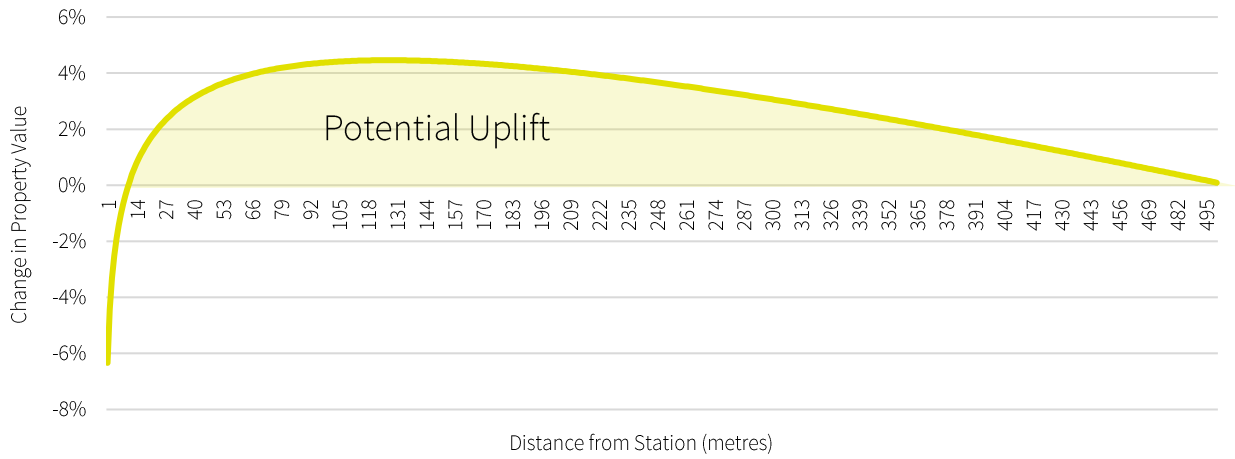
i. Calgary, Canada: 7th Avenue Red Line LRT

The Calgary CTrain Red line links northern and southern suburban communities with the downtown core. Since 1978 Calgary has been building LRT including 9 expansions between 1987 – 2015 accounting for 59km and 45 Stations.[67] It is a mixed surface elevated and tunneled system but both alignments run along 7 Avenue SW through the central business district surface. Notably, the entire LRT system is free to ride downtown. The LRT currently crosses the Bow River on a series of elevated bridges.

In a Hatch study of property value impacts due to the Calgary Red Line written prior to this report (in 2016), a hedonic model was used to understand the correlation between property value gains (or loss) and a property's proximity to a transit station. The study analyzed assessed property values between 1998 to 2016 (an 18-year period) from all properties located within an 800-metre radius from all Red Line C-train Stations. It confirmed the strong correlation between property value uplifts and proximity to transit access, though it varied by real estate use and in a logarithmic pattern, decreasing to no effect after a certain distance.

Single-detached residences saw property value uplifts up to just over 4%. Uplifts experienced a peak at around 150-metres, while there appeared to be negative impacts to property values when the residences were within 10-metres of a station.

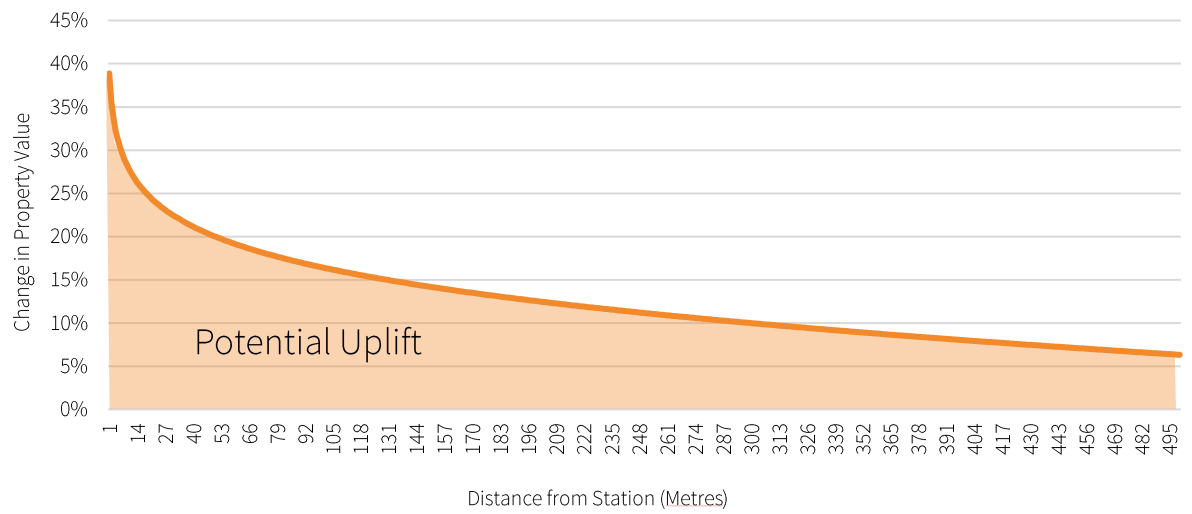
Figure 223 – Single-Detached Property Value Uplift due to the Calgary Red Line (1998-2016)



Multi-family residences saw property value uplifts up to just under 40%. Uplifts were highest within the immediate proximity to a station (at around 100-metres) with declining premiums of lower than 5% beyond 500-metres of the station.

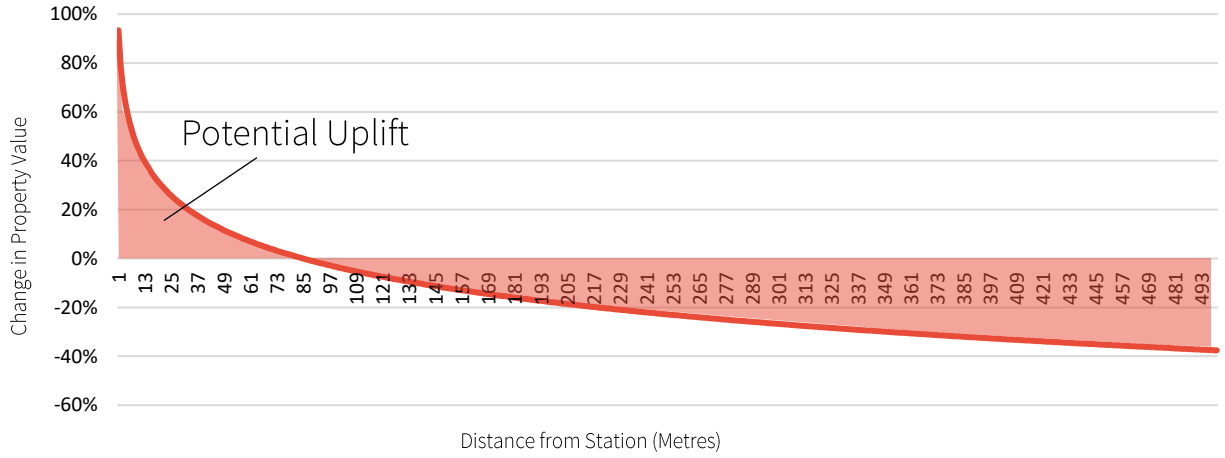
[67] https://www.calgary.ca/PDA/pd/Documents/municipal-development-plan/lrt-history-calgary.pdf

Figure 234 – Multi-Family Property Value Uplift due to the Calgary Red Line (1998-2016)



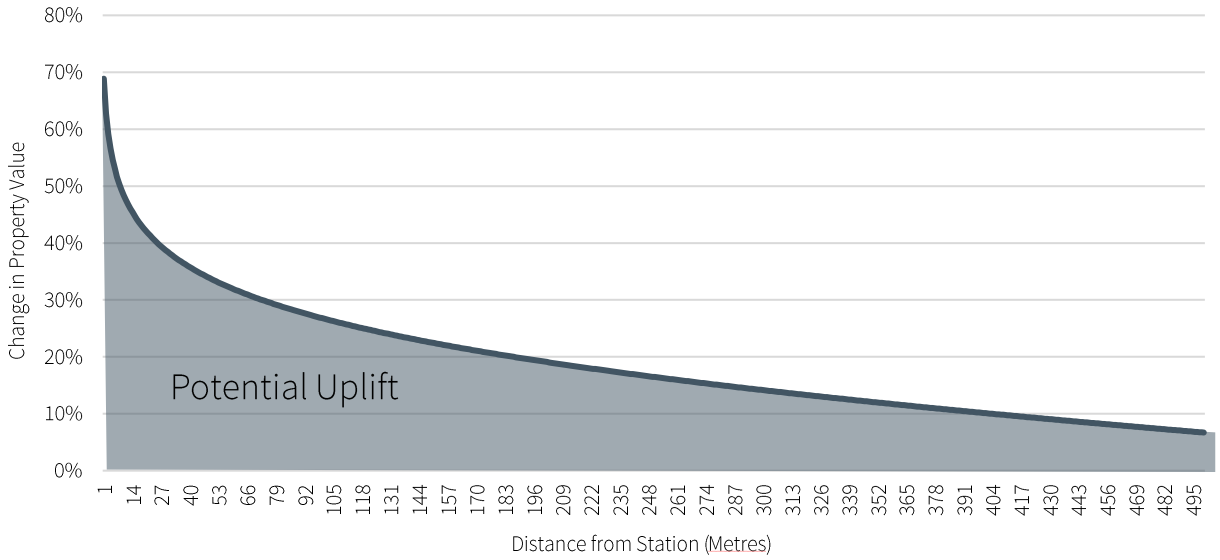
Retail properties saw their values uplifted over 90%, though immediately declined to *below-median* levels beyond approximately 100-metres to a station.

Figure 245 – Retail Property Value Uplift due to the Calgary Red Line (1998-2016)



Office properties saw their values uplifted to just under 70%. Uplifts were highest within the immediate proximity to a station (at around 100-metres) with declining premiums of lower than 5% beyond 500-metres.

Figure 256 – Office Property Value Uplift due to the Calgary Red Line (1998-2016)



The higher-density land uses of multifamily, retail and office that are located within the immediate proximity to a transit station experienced the most significant property value uplift partly due to substantial, induced intensification.

ii. Vancouver, Canada: Canada Line SkyTrain

The Canada Line is an extension to the Vancouver SkyTrain rail system and connects downtown Vancouver with the suburb of Richmond and Vancouver International Airport. Owned and operated by Translink, the Canada Line runs at a length of 19.2 km with 16 stations. The project had an estimated capital cost of $2 billion.

In a study that estimated the property impacts of the Canada Line extension, impacts were minimal beyond a 300-metres radius from station areas. The study's base case assumed an increase in commercial and residential land values of 1.5% per year excluding inflation. After construction, commercial land values were forecasted to increase at 3.5% per year and residential land values at 3.0% per year, excluding inflation. The projected increase in land values was $75 million. To undertake the assessment, the study assumed no change in the current zoning. Although, should zoning changes occur to allow higher value and higher density development, "significantly higher" land values would occur as a result.

After the fact, it has also been noted that commercial real estate located adjacent or close to transit nodes have lower vacancy and commands higher rents within Metro Vancouver.[68]

> *An economic benefits report conducted on behalf of the City of Surrey suggests light rail lines in Surrey would attract investment in the city centre, generate higher-value jobs and diversify the city's labour force over 30 years. The report also noted that light rail is more feasible than the elevated SkyTrain system because it has more frequent stops, attracts more retail investment at grade level and makes better use of the estimated 41 million square feet of redevelopment capacity around the proposed stations.*[69]

A 1988 study conducted on the original Vancouver SkyTrain using the hedonic pricing model found that there was a price premium of over $14.70 per square foot for each foot closer to the station. The spatial extent of this effect was measured to be 2,400 feet (about 730-metres). While this study is over 30 years old, given the increasing demand for housing in Vancouver and the strong growth of the region's economy, these impacts are anticipated to be more exacerbated as demand for station proximate land increases.

Furthermore, it was estimated that the implementation of the Canada Line would result in more rapid development of real estate in the vicinity of the transit stations, which in turn would result in higher property taxes. The property tax revenue increase through 2050 was estimated between $14 to 28 million.

Figure 267 – Canada Line SkyTrain in Vancouver, Canada nearby Marine Drive Station (TransLink)

[68] M. Reuter. *Empirical Proof that Transit Protects or Enhances Your Property Values."* Real Estate Intelligence Network. July 2014.
[69] Avison Young. *Unlocking Generational Aspirations: A Commercial Real Estate Perspective on Public Transit & Transportation Infrastructure Investment in Metro Vancouver.* June 2015

iii. Ottawa, Canada: Confederation Line LRT

The $2.1 billion project was built under a public-private partnership between the City of Ottawa and the Rideau Transit Group Partnership, and was opened in 2019.[70]

The 12.5 km electric light rail system replaced existing diesel powered buses, providing rapid transit between Blair Station in the east and Tunney's Pasture in the west. The 12.5 km route includes 13 stations and a 2.5 km tunnel through Downtown Ottawa that will alleviate congestion through the core.

In 2005, the City completed a study entitled "Strategic Assessment: North-South Light Rail Value Uplift and Capture (Value-Uplift Study)." This study examined development opportunities within a 400-metres radius around the (then) 15 stations proposed for the North-South LRT project. It estimated that the impact area would receive 5.3% of the city's annual 1 million square metres of new development, and that this share would increase by 20%, to around 6.4% with the presence of LRT.

The estimated value of all properties in the impact area was $4.8 billion, with $1.7 billion in development to likely occur in the Base Case (no LRT). This is compared to an additional $766 million in development to likely occur with an LRT over a 15-year period. The study also noted that the city could potentially capture between $80 million and $125 million of this development through a combination of property tax surcharges, development charges, and direct participation in the projects as a partner, where appropriate and feasible.

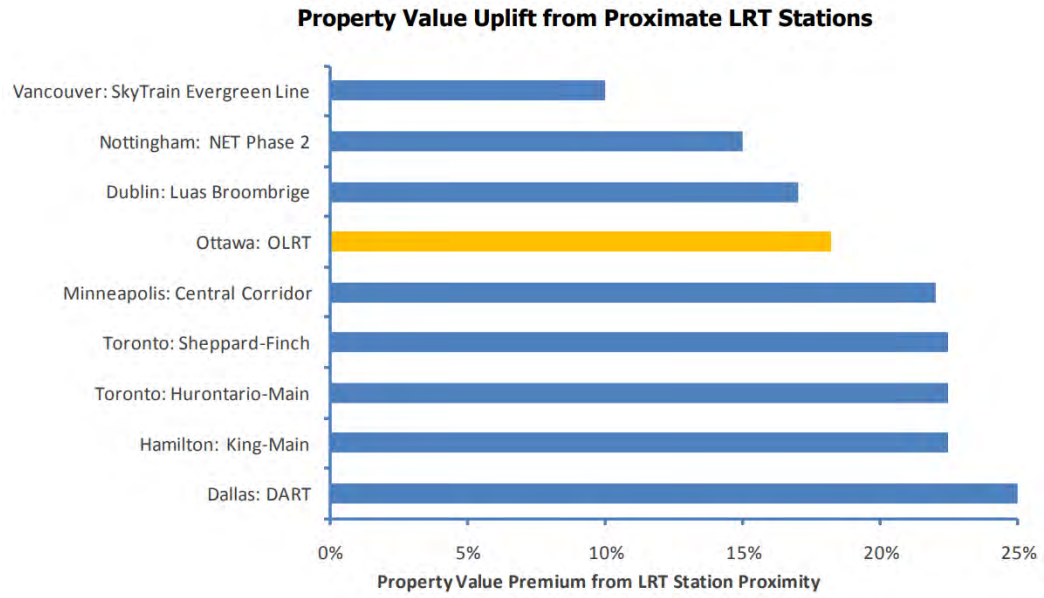
Figure 38 – Overview map of the Confederation Line LRT

After the fact, property prices were evaluated within an 800-metres of stations and the results were similar to what the initial research had projected. From 2008 to 2017, Real estate prices increased roughly 39% since the announcement of the LRT, compared to an overall increase of 37% across the entire City. This suggests a 2% premium for real estate that is closer to transit. There was a spike in prices when the LRT was announced and funding was confirmed. During the construction phases, prices dropped and/or stagnated largely due to delays in

[70] Transport Canada. Transportation in Canada: Overview Report, 2013.

construction, noise, inconvenience, air pollution and general nuisance impacts dissuaded people from living in the area. Since the opening of the line, there has been a further decrease in property values however, as the line matures and operations become more consistent, research and experience suggests that property values will increase approximately 10% over other areas of Ottawa without LRT access. [71]

Figure 39 – Summary graph of reported property value uplift from study



In Ottawa, the presence of an existing bus rapid transit (BRT) system may have somewhat reduced the impact on the uplift resulting from the LRT. The area that is likely to see the highest uplift is "the commercial laden downtown core due to the high potential uplift rates seen on commercial properties." [72] Areas with little commercial space are considered to experience a substantial land value uplift, albeit relatively moderate compared to that of the downtown core.

[71] http://cdn3.reincanada.com/workshops/2019_Workshops/March_2019_Calgary_SOS/Calgary_Transportation_Effect_Report_FINAL.pdf
[72] Ottawa Light Rail Transit Economic Impact Study. 2011

iv. Toronto Canada: St. Clair Streetcar

The dedicated streetcar right-of-way along St. Clair Avenue kickstarted a new era in Toronto's streetcar and LRT development. After operating in mixed-traffic for decades, the grade separation project was completed in 2010. The streetcar serves an established and growing residential and commercial area, terminating at an intensifying commercial node while connecting to the City's underground subway system. Since the project's completion, there has been significant inducement of mixed-use development which has further spurred local economic activity.

In downtown Toronto overall, a 2015 study by Avison Young compared commercial property sales within the downtown core from 2012 to 2015 between: ***commercial buildings less than 500-metres from a station*** and ***commercial buildings outside that range***. The study found that the commercial properties that were closer to the subway station sold for an average $475 per square foot, or 30% more than properties beyond 500-metres.[73]

Figure 270 – St. Clair Streetcar Dedicated Right-of-Way

Since the implementation and completion of construction, there have been a number of local impacts measured that are attributed to the grade-separated transit investment. Traffic volumes have been observed as having decreased by as much as 23% in some locations.[74] Despite the alignment running down the centre of St. Clair Avenue and there being significant impacts to the road network during construction, 93% of all on-street parking spaces were retained since the completion of the project. Additional parking spaces were also added off the right-of-way to provide additional parking solutions for commercial and retail business activity along the corridor.[75]

While many of the changes that have occurred along St. Clair Avenue are attributed to and in response to market conditions, the dedicated surface streetcar route has supported this growth by providing incoming residents and businesses reliable alternatives to automobile use.

In a 2011 study that compared traffic and ridership levels along the route, suggested that the final outcome of the St. Clair project should be hailed as a success, rather than the disaster some critics claim. The average daily ridership on the line had increased from 28,500 in 2005 (before construction started) to 32,400 in 2011. The average morning rush hour round trip was eight minutes shorter in 2011 than 2005. On Saturday mornings, the average round trip had been shortened by fourteen minutes. Thanks in part to the increase in ridership, the TTC had actually increased frequencies along the line by anywhere from 7% to 45%. On average, the St. Clair streetcar is scheduled to operate

[73] Avison Young. Making the connection: Subway proximity offers multiple benefits for Downtown Toronto office buildings. 2015.
[74] Ryerson City Building Institute. Toronto's Great Streets: Redesigning Streets for a Growing City and Better Neighbourhoods. July 2018.
[75] ibid

at frequencies of 2 minutes, 55 seconds. For most of the route, vehicular congestion had also decreased, by as much as 40% in certain areas at certain times of the day, and accidents were down.

To try and ameliorate the impact that the St. Clair streetcar project placed on local businesses while construction was taking place, the TTC adopted a special timed-transfer arrangement on St. Clair, allowing passengers to stop over, shop, and re-board transit vehicles without paying an additional fare. Additionally, The TTC could have done much to mute this controversy through a more conciliatory approach in its public consultation.

Relevant to the City of Calgary are the characteristics of the line itself. The majority runs surface along St. Clair Avenue. However, where the streetcar meets the subway station at St. Clair Avenue and Bathurst Street, a portal has been constructed to allow the streetcar to go below ground and connect riders to the subway system. The result is two portals allowing for east and westbound transit vehicles to navigate below ground. The portals are similar to the portal envisioned at 2 Street SW and 3 Avenue SW.

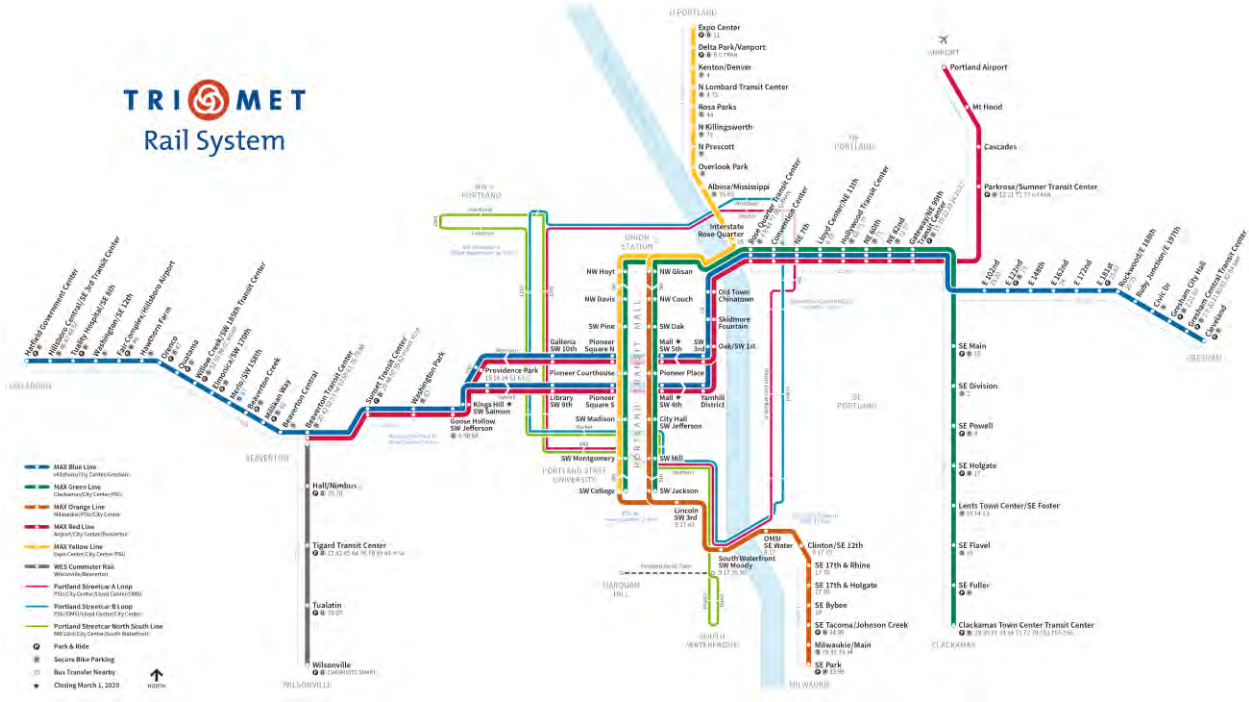
Figure 281 – Google Street View of St. Clair Streetcar portal connecting to underground interchange with subway

v. Portland, US: MAX LRT

Portland's MAX (Metropolitan Area Express) Light Rail connects Portland City Center with Beaverton, Clackamas, Gresham, Hillsboro, Milwaukie, North/Northeast Portland and Portland International Airport.[76] It is operated by TriMet (the Tri-County Metropolitan Transportation District of Oregon), and runs on 60 miles of track and serves 97 stations. As of 2019, the system has an annual ridership of almost 39 million.[77] The system is composed of five lines:

- Blue Line (Hillsboro/City Center/Gresham) – Completed 1986
- Red Line (Airport/City Center/Beaverton) – Completed 2001
- Yellow Line (Expo Center/City Center/PSU) – Completed 2004
- Green Line (Clackamas/City Center/PSU) – Completed 2009
- Orange Line (Milwaukie/City Center) – Completed 2015

Figure 292 – TriMet Rail System



The MAX Light Rail system is generally considered a great transit, mobility, and transit oriented development success. Prior to development, it was speculated that the light rail might have greater redevelopment impacts, dollar-for-dollar, than heavy rail because LRT "operates at the surface and offers visibility, penetrates the community and is not separated… like heavy rail, which is down in a hole or up in the air, and is part of the urban experience—an amenity, a signature for the area."[78] This has proven to be true in the case of Portland's MAX system.

[76] https://trimet.org/max/
[77] https://trimet.org/about/pdf/trimetridership.pdf
[78] https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_07.pdf

Figure 303 – Portland MAX LRT (TriMET)

According to TriMet as of 2016, over $13.2 billion in development has occurred within walking distances of MAX system stations since the decision to build in 1980.[79] Studies conducted to date have focused on the residential property value impacts of the MAX light rail, and have focused primarily on the Blue Line (both the east and the west sides). Research generally has found that light rail transit has a positive impact on residential property values. One study found that property values in Portland increased by $75 for every 100 feet (about 30-metres) closer a home is to a light-rail station when it is within a half-mile to mile (about 800 to 1,600-metres) radius of the station.[80] Another study found that home prices increased as a result of being closer to a station, but the effect was only significant within 1,500 feet (just less than 500-metres) of the station. This study found that home values increased $32 per meter the closer homes are to an LRT station.[81] Another study indicated that, while properties within a half mile of Portland's MAX stations command a premium, those within half mile of the line, but not near a station, decreased in value.[82]

A study of Portland's MAX Blue Line found that median house values increased at increasing rates the closer it was to an LRT station. This study found that a home located very near an LRT station will gain about 5 percent of its value if within 400 feet (122- metres) away, only 2 percent over the next 200 feet, and just 1 percent over another 200 feet (61-metres) away from a station. The largest price difference ($2,300) occurs between the station and 200 feet away. In other words, the closer the home is to an LRT station the higher its value.[83] While these studies are the most comprehensive, recent, and conclusive research available about Portland's property values in relation to the MAX Light Rail system, it should be noted that they are primarily from the 1990s and early 2000s.

While not part of the MAX system, in Downtown Portland, positive commercial property value increases have been observed along the Portland Streetcar line, a separate light rail line. Between 1997 and 2008, multifamily home values increased by 205% compared to 118% for the city as a whole, equivalent to differential annual rate of

[79] https://trimet.org/publications/pdf/factsheets/regionaltransportation.pdf
[80] Lewis-Workman, Steven and Brod, Daniel. "Measuring the Neighborhood Benefits of Rail Transit Accessibility." Transportation Research Record, No. 1576, 1997, pp. 147-153.
[81] Chen, Hong; Rufolo, Anthony; and Dueker, Kenneth. "Measuring the Impact of Light Rail Systems on Single Family Home Values: A Hedonic Approach with GIS Applications." Transportation Research Record, No. 1617, 1998, pp. 38-43.
[82] Kilpatrick, J. et al. (2007). *The Impact of Transit Corridors on Residential Property Values.* Journal of Real Estate Research. February 2007.
[83] Dueker, Kenneth J. and Martha J. Bianco. (1999). Light Rail Transit Impacts in Portland: The First Ten Years. Presented at Transportation Research Board, 78th Annual Meeting.

appreciation of 3.3%. Commercial property assessments grew by 231%, outpacing the rest of the city where commercial property value grew by 130%. This is equivalent to an annual differential growth premium of 3.6%.[84]

While the studies of commercial property increases are more limited, one study of the Portland Streetcar (a separate system from the MAX system), which opened in 2001, found that "first five years revealed a 62% increase over other city commercial properties. This could point to the value increase of all non-residential properties in and around the streetcar line. During the next six years, the value change was even with the rest of the city, signaling that retailers and commercial office have possibly realized their value during the announcement of the alignment and stayed flat after the initial bump."[85]

Areas around MAX stations have also seen an increase in density. A study of Blue Line light rail station areas found that development occurring after light rail investment has an average development density or Floor Area Ratio (FAR) of 0.65, which is greater than the average FAR for development outside of station areas. This means that for every 1,000 square feet of land area developed, station area tax properties realized an additional 650 square feet of building area. The rate of development within Blue Line station areas was 69 percent higher than elsewhere within a one-mile corridor extending along the light rail alignment. Additionally, low and moderate value properties within Blue Line station areas redeveloped at twice the redevelopment rate reported for low value properties outside of station areas.[86]

TriMet also utilized innovative methods when planning and constructing the Green and Yellow Lines. During the Green Line construction, several methods were undertaken to minimize disruption to small businesses in the Portland Mall area. TriMet provided one-on-one support for businesses and property owners, created and maintained a project website that tracked construction progress and weekly construction updates sent via email to downtown businesses, and worked with contractors to ensure that customers had access to businesses during construction[87]. During construction of the Yellow Line, TriMet partners created an advertising and marketing campaign to draw in business to the Interstate Avenue area, where many small businesses are located. Eight months after the Yellow Line opened, over 50 new businesses had opened on Interstate Avenue, unhampered by construction disruptions or deterrence.[88]

The impact of public policy and strategic planning has also had a positive impact on land and property values. Using data from Washington County, served by Portland's Westside Blue Line, research found that announcements on the planned siting of light-rail stations and the use of zoning tools (e.g., overlays and interim restrictions) to promote transit oriented development induced land-value increases even before the system began operating.[89] (Although induced land-value increases before actual development becomes an increased cost to developers.)

Portland's zoning and transit oriented development policies have also contributed to the success of light rail development. The city has an overlay zone called the Light Rail Transit Zone. This designation increases permitted densities, restricts auto-oriented uses, and encourages pedestrian-oriented development in LRT station areas, including small retail shops, restaurants, outdoor cafes, benches, and kiosks.[90] Additionally, the 2040 Growth

[84] Brookings Institution, HDR, Reconnecting America, RCLCO. Value Capture and Tax-Increment Financing Options for Streetcar Construction. 2009.
[85] http://www.reconnectingamerica.org/assets/Uploads/brookingsvalueaddedtif2009.pdf
[86] https://trimet.org/pdfs/publications/Livable-Portland.pdf
[87] https://trimet.org/publications/pdf/factsheets/max-greenline.pdf
[88] https://trimet.org/publications/pdf/factsheets/max-yellowline.pdf
[89] G. Knaap, C. Ding, and L. Hopkins, "Do Plans Matter? The Effects of Light Rail Plans on Land Values in Station Areas," Journal of Planning Education and Research, Vol. 21 (2001): 32–39.
[90] http://www3.drcog.org/documents/archive/LRT%20and%20TOD.pdf

Management Strategy, adopted by the Metro Council in 1995, features a tight Urban Growth Boundary for the Portland metropolitan area, focusing growth in transit centers and corridors, and requires local governments to limit parking, and adopt zoning and comprehensive plan changes to be consistent with the plan. Two-thirds of jobs and 40% of households are designated to be in centers and corridors served by buses and LRT.[91]

The Portland region also uses financial incentives to achieve greater density, a mix of land uses, better design, and lower parking ratios in transit oriented development areas. More than a $3 billion investment in new development has occurred within walking distance of the stations along Portland's light rail lines.[92] While the vast majority of those transit oriented development projects received no form of public subsidy, the Oregon legislature enabled 10-year property tax abatement for transit oriented development in 1995.[93] The Yellow Line was "intended to stimulate reinvestment in the commercial corridor and residential areas surrounding the MAX stations," and it was largely successful in this, with several new schools, small businesses, and residential developments have since opened on Interstate Avenue, part of the Yellow line corridor.[94]

[91] http://www3.drcog.org/documents/archive/LRT%20and%20TOD.pdf
[92] TriMet, Facts 2002.
[93] http://www3.drcog.org/documents/archive/LRT%20and%20TOD.pdf
[94] https://trimet.org/publications/pdf/factsheets/max-yellowline.pdf

vi. Buffalo, US: Metro Rail

The Buffalo Metro Rail is a 10.3-kilometre long light rail line that runs through downtown Buffalo connecting the University of Buffalo to the core. While the proximity to stations generally increases property values, the effect in Buffalo is weak, especially compared with other areas that demonstrated much stronger growth in property values.

The often-cited Buffalo Metro Rail LRT is an example of an underperforming LRT line that did not create the anticipated development needed to revitalize Buffalo's city centre and reverse the shrinking population.

Subsequent analysis also suggests that transit accessibility in cities like Buffalo does not play a large role in property values. A hedonic model was used to study the mechanisms behind impacts to property values in Buffalo. The study suggests that property characteristics and the local neighbourhood characteristics were more strongly related to property value uplifts, such as the size of a land parcel, or the number of bathrooms.[95]

Figure 314 – Buffalo Metro Rail LRT

The Metro Rail's underperformance was predicted by leading transit researchers. While light rail transit in Buffalo was perceived as a necessity for urban revitalisation and had sufficient political backing, the lack of a strong regional economy limited the potential of Metro Rail as a catalyst to revitalize downtown and neighbourhoods.

Within a half-mile (800-metres) radius of rail stations, land is valued $2.31 higher (using straight-line distance), or $0.99 higher (using actual walking distance) for every foot closer to a light rail station. Consequently, an average home anywhere in the study area along the light rail line would generally be worth between $990 and $2,310 more than the average home if it were within 1,000 feet (300-metres) of a station.[96]

Perhaps more interesting is that decades after the completion of the line, ridership has only recently begun to increase and the LRT has been given the green light for a significant expansion. There may be an argument that transit investment over a longer timeframe and having gone through multiple economic cycles will increase ridership and help strengthen property values—justifying the continued transit investment.

[95] Hess, D. and Almeida, T. 2007. Impact of Proximity to Light Rail Rapid Transit on Station-area Property Values in Buffalo, New York. *Urban Studies, Vol. 44, 1041-1868*
[96] Ibid.

i. New Jersey, US: Hudson-Bergen LRT

Figure 325: Hudson-Bergen Light Rail System Map

The Hudson-Bergen Light Rail (HBLR) is a light rail system that connects the cities of Bayonne, Jersey City, Hoboken, Weehawken, Union City, and North Bergen in Hudson County, New Jersey (NJ). The system has connections with the Port Authority Trans-Hudson (PATH) train system, ferries, and New Jersey Transit (NJ Transit) commuter rail. The system is owned by New Jersey Transit and operated by 21st Century Rail Corporation, and was the first public transit project in the United States to use the Design, Build, Operate and Maintain (DBOM) construction methodology.[97]

The system consists of three lines: Tonnelle Avenue to Hoboken, West Side Avenue to Tonnelle Avenue, and 8th Street to Hoboken. The system began operating the first segment in 2000, and the system was fully completed in 2011. It has 24 stations along a track length of 17 miles.

There are currently two planned extensions to the HBLR: an extension north to Bergen County, and an extension west to expand the West Side Avenue branch. The extension to Bergen County, called the Northern Branch Corridor Project, has been approved by NJ Transit to Englewood from the current terminus in Tonnelle Avenue. This 10-mile extension would include the construction of seven additional stations.

Figure 336: HBLR and residential Development in Newport, Jersey City (NYT)

The West Side Avenue extension is approximately 3,700 feet in length and will include one new station west of Highway 440 to support Jersey City's planned development on the Hackensack waterfront. The project is currently in the Preliminary Engineering phase.[98]

As with the case of Portland's light rail system, the studies that have

[97] https://www.njtransit.com/tm/tm_servlet.srv?hdnPageAction=Project001To
[98] https://hblr440.com/

been undertaken focus on the residential property value impacts. One study showed that residential properties near West Side Avenue (Jersey City), 9th Street (Hoboken), and 22nd Street (Bayonne) Stations appreciated the most. Properties around these stations achieved an annual rate of price appreciation that was 17-20% higher than comparable, less transit-accessible properties. This appreciation was limited to a 0.25 mile (approximately 400 metres) radius around stations, and there was no appreciation beyond that radius. However, property value appreciation was found to be negligible around stations that were already well-served by transit.[99]

The HBLR has also helped increase economic development along the system's route, particularly in Jersey City, Hoboken, and Weehawken. A report by Booz Allen Hamilton on the HBLR and economic development says that "while it would be unreasonable to directly attribute the many economic successes on the waterfront to the development of the light rail line, clearly there is a symbiotic relationship between the two that has existed over the past 15 years as the system has been planned, constructed, and implemented."[100] The study found that developers have "shift[ed] away from the PATH stations hubs. They are investing in properties along the light rail alignment, they are showing more attention to the residential market, and they are "selling" the amenities and connectivity that the light rail line provides." This includes development at and around Exchange Place and Newport in Jersey City in the early 2000s, and more recently in Jersey City in the Liberty Harbor North and Bergen Layfette neighborhoods.

Figure 347 – Development at Port Imperial (Source: Avora at Port Imperial)

Additionally, this same study also found that land use patterns have changed as the light rail facilitated residential infill development and greater development density, as light rail stations are spaced closer together than PATH stations are. PATH stations saw "localized, concentrated, heavily office-based development occurring within a 0.25-

[99] Brookings Institution, HDR, Reconnecting America, RCLCO. Value Capture and Tax-Increment Financing Options for Streetcar Construction. 2009.
[100] http://www.reconnectingamerica.org/assets/Uploads/bestpractice097.pdf

mile (400-metres) radius." In contrast, the HBLR stations "brought development into locations that office space developers would not be interested in." [101]

Transit oriented development has also accelerated around some HBLR stations. A 2008 study found that over 10,000 new residential units were either built or under construction as of 2008 around just five HBLR stations (Hoboken 9th Street, Essex Street-Jersey Avenue, 34th Street Bayonne, Port Imperial, and Bergenline Avenue).[102] Over 4,000 of these units were in the vicinity of the Essex Street-Jersey Avenue Station, and over 3,000 were near Port Imperial Station. The report summarized that around HBLR stations "large quantities of underutilized land around rail stations are being reclaimed for productive use and being replaced by compact, pedestrian-friendly, mixed-use developments with convenient access to public transportation at a scale beyond that which the local road network could borne." [103]

[101] http://www.reconnectingamerica.org/assets/Uploads/bestpractice097.pdf
[102] http://www.reconnectingamerica.org/assets/Uploads/200804HBLR.pdf
[103] Ibid.